2024 – 2028 Hazard Mitigation Plan

Adopted: TBD

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Executive Summary

Natural and human-caused hazards have potential immediate and long-lasting impacts on the lives of people and their communities, financially, economically, and psychologically. Such hazards have the potential to disrupt entire communities. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. This Hazard Mitigation Plan (HMP) represents the Sacramento Municipal Utility District's (SMUD's) commitment to reduce and eliminate, where possible, the potential risks and impacts of natural and human-created hazards. The HMP serves to help protect SMUD's assets, customers, and communities by improving disaster preparedness and increasing resiliency. It also serves as a guide for SMUD decisionmakers as they commit resources to reducing the effects of potential hazards on SMUD's energy infrastructure and workforce.

SMUD's HMP is a single-jurisdiction plan that geographically covers all areas where SMUD owns, partially owns, or operates critical infrastructure (hereinafter referred to as the Plan Area).

The HMP represents SMUD's commitment to reduce and eliminate, where possible, the risks and impacts of natural and human-caused hazards. The HMP serves to help protect SMUD's assets, customers, and communities by coordinating our broad-based disaster preparedness and resiliency efforts.
The HMP:

1. Identifies potential hazards faced by communities where SMUD maintains assets or operations,
2. Assesses the vulnerability of those assets and operations to such hazards, and
3. Identifies specific actions that can be taken to reduce the risk from identified hazards.

Plan Update

This plan is a comprehensive update of the 2019 SMUD Hazard Mitigation Plan, which was approved by FEMA on July 11, 2019, and is set to expire July 11, 2024.

SMUD's 2024-2028 HMP update meets federal requirements for updating hazard mitigation plans on a five-year cycle. It represents the third iteration of SMUD's hazard mitigation plan, which was initially part of El Dorado County's HMP. The scope of this HMP update covers 22 counties where SMUD owns, partially owns, or operates critical infrastructure. These counties include areas of Sacramento, El Dorado, Placer, Solano, Colusa, Yolo, Sutter, Alameda, Contra Costa, Glenn, Kings, Kern, Fresno, Merced, Modoc, San Joaquin, Santa Clara, San Bernardino, San Benito, Shasta, Siskiyou, Stanislaus, and Tehama counties.

Plan Update Approach

A governance structure was developed to coordinate the update of the HMP. It included Executive oversight, a director level steering committee, a planning committee, and core team, each with its own roles and responsibilities. The communications team implemented a multi-media public involvement strategy based on past experience, utilizing a number of outreach capabilities including posting public notices in local newspapers, community outreach events, sharing information with public agency partners, local non-profits and supporting agencies, as well as via email.

A draft of this plan was posted on smud.org for public comments in advance of the (date) SMUD (name) Committee Meeting and will be considered for approval by the SMUD Board of Directors within eight weeks of receipt of pre-approval from California Governor's Office of Emergency Services (Cal OES) and the Federal Emergency Management Agency (FEMA).

1.0 Introduction

1.1 Background

FEMA defines "hazard" as "any event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural losses, damage to the environment, interruption of business, or other types of harm or loss." Additionally, hazard mitigation is "any sustained action taken to reduce or eliminate the long-term risk to human life and property from a hazard event" (44 CFR §201.2). The purpose of hazard mitigation is to reduce potential losses from future disasters. Hazard mitigation planning is essential in helping to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster. A hazard mitigation plan forms the foundation of a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repetitive damage. The "purpose of mitigation planning is for state, local and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources" (44 CFR § 201.1(b)).

The Disaster Mitigation Act of 2000 (DMA 2000) is federal legislation that establishes a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). DMA 2000 sets as a condition for receiving federal disaster grant assistant, that state and local government agencies need to have a Federal Emergency Management Agency (FEMA) approved hazard mitigation. DMA 2000 outlines the process that cities, counties, and special districts follow to develop a Hazard Mitigation Plan (HMP).

FEMA supports local hazard mitigation planning and the achievement of the following principles:

- Plan and invest for the future;
- Collaborate and engage early; and
- Integrate community planning.

1.2 Mitigation Plan Update

SMUD has prepared this update to the 2019 Hazard Mitigation Plan in accordance with the requirements under DMA 2000. The HMP update was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. The regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for funding from certain Stafford Act grant programs such as FEMA's Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Assistance (PDM) Program, the Flood Mitigation Assistance (FMA) Program, the Fire Management Assistance Grant (FMAG), and Public Assistance (PA). This planning effort follows FEMA's 2023 Local Mitigation Planning Policy Guide (FP 206-21-0002).

1.3 Purpose

This HMP represents SMUD's commitment to reduce the potential risks and impacts of natural and human-caused hazards and serves to help protect SMUD's, customers, and communities by improving disaster preparedness and increased resiliency. It also serves as a guide for SMUD decision-makers as they commit resources to reducing the effects of potential hazards on SMUD's energy infrastructure and workforce. The scope of this HMP is limited to the geographic areas of Sacramento, El Dorado, Placer, Solano, Colusa, Yolo, Sutter, Alameda, Contra Costa, Glenn, Kings, Kern, Fresno, Merced, Modoc, San Joaquin, Santa Clara, San Bernardino, San Benito, Shasta, Siskiyou, Stanislaus, and Tehama counties where SMUD owns, partially owns, or operates critical infrastructure facilities. These facilities include, but are not limited to, commercial property, real estate, dams, powerhouses, transmission lines, distribution lines, roads, wind turbines, solar arrays, batteries, and gas pipelines. Each of these facilities is critical to maintaining the flow of power from generating facilities through the transmission lines into Sacramento County. The proper maintenance of these assets helps protect the communities from impacts as a result of natural and man-made hazards such as wildfires, severe storms, dam failure, blackouts, and road closures to name a few.

SMUD's resiliency can be improved through the proper identification, analysis, planning, and evaluation of proper risk response or mitigation and monitoring of the hazards to which SMUD is most vulnerable. This HMP provides a framework to conduct such an assessment.

This SMUD 2024-2028 HMP Update (is as a single-jurisdiction plan that geographically covers all areas where SMUD directly owns and/or has an ownership and/or operational share of critical infrastructure (hereinafter referred to as the Plan Area). Several stakeholders, including public and private agencies, participated in the planning process.

Information in this plan will be used to help guide and coordinate mitigation activities for SMUD. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical facilities, reducing liability exposure, and minimizing overall customer and community impacts and disruptions.

1.4 Contents of Updated Plan

This HMP is organized into four primary parts:

- Part 1 – Planning Process and Community Profile
- Part 2 – Risk Assessment
- Part 3 – Mitigation Strategy
- Part 4 – Plan Maintenance

Each part includes elements required Title 44 Code of Federal Regulations (CFR) Section 201.6, *Local Mitigation Plans*. Compliance section requirements are cited at the beginning of subsections where appropriate to demonstrate compliance.

2.0 Updates to Plan

2.1 Previous Plans

On September 21, 2017, through SMUD Board Resolution 17-09-09, SMUD's Board of Directors adopted the El Dorado County Local HMP Annex (Annexation Plan). The Annexation Plan focused on SMUD's assets located in El Dorado County and addressed wildland fire, severe storms, and dam/levee failure hazards.

In June 2018, SMUD received grant funding from FEMA under Disaster Recovery (DR) number 4308 to develop its first single-jurisdiction HMP which included additionally identified hazards and a greater planning area. This plan was adopted by SMUD's board June 24, 2019, by Board Resolution 19-06-06. The plan was approved by FEMA on July 11, 2019 and expires July 11, 2024.

2.2 Update

2.2.1 Grant Funding

On August 21, 2023, SMUD received grant funding from FEMA under DR-4619-469-007P to update its HMP in accordance with DMA 2000 requirements. The funding was used in the development of this 2024-2028 HMP.

2.2.2 Federal Eligibility

Part 44 of the Code of Federal Regulations (CFR) stipulates that a jurisdiction covered by a plan that has expired is not able to pursue federal funding for which a current hazard mitigation plan is a prerequisite. SMUD anticipates continuing to pursue FEMA grant funding for various hazard mitigations where a Plan is a prerequisite.

2.2.3 Changes in Development

SMUD continually identifies and assesses changes and developments that could impact or change the levels of risks associated with hazards prone to our planning area. This helps to ensure that mitigation strategies continue to address the risks and vulnerabilities of potential development and takes into consideration possible future conditions that could impact the hazard risk profiles allowing SMUD to allocate resources more efficiently to address SMUD's highest areas of vulnerabilities.

2.3 What Has Changed

SMUD's 2024-2028 HMP includes several changes including format changes for readability and citation of requirements to demonstrate compliance with CFR Part 44. The following are some highlights of additional changes:

- Enhanced risk assessment,
- Enhanced integrated risk and enterprise business planning,
- Updated and enhanced public outreach,
- Incorporation of SMUD's Zero Carbon Plan,
- Enhance communications to address vulnerable communities,
- Identification of high hazard dams, and
- Enhanced section on climate change.

Table 1: 44 CFR Requirements Met		
44 CFR Requirement	**Sections in 2024-2028 HMP**	**Comments**
§ 201.6(c)(1): Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?	3.1 Governance and Planning Team 3.7 Plan Milestones	
§ 201.6(b)(2): Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process?	3.3 Stakeholder and Agency Coordination 3.4 Regional Participation	
§ 201.6(b)(1): Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval?	3.5 Public Involvement	
§ 201.6(b)(3): Does the plan describe the review and incorporation of existing plans, studies, reports and technical information?	3.6 Existing Documents and Programs 9.0 Regulations and Programs 9.1 Federal and State	
§ 201.6(c)(2)(i): Does the plan include a description of the type, location and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events?	8.1 Disaster Declaration 10.2 Risk Assessment Approach	

Table 1: 44 CFR Requirements Met		
44 CFR Requirement	**Sections in 2024-2028 HMP**	**Comments**
§ 201.6(c)(2)(ii): Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP insured structures that have been repetitively damaged by floods?	9.3 NFIP Compliance 10.2 Risk Assessment Approach	Previously damaged by floods: Slab Creek Powerhouse
§ 201.6(c)(3): Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?	9.0 Regulations and Programs 9.1 Federal and State	
§ 201.6(c)(3)(ii)): Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate?	9.3 NFIP Compliance	
§ 201.6(c)(3)(i): Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?	21.0 Action Plan and Implementation	
§ 201.6(c)(3)(ii): Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?	3.2 Defining Planning Area 21.0 Action Plan and Implementation	
§ 201.6(c)(3)(iii) & § 201.6(c)(3)(iv): Does the plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented and administered by each jurisdiction?	19.2 Risk Prioritization 21.3 Action Plan Prioritization	

Table 1: 44 CFR Requirements Met		
44 CFR Requirement	**Sections in 2024-2028 HMP**	**Comments**
§ 201.6(c)(4)(iii): Is there discussion of how each community will continue public participation in the plan maintenance process?	22.4 Continuing Public Involvement	
§ 201.6(c)(4)(i): Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating, and updating the mitigation plan within a five-year cycle)?	22.3 Plan Maintenance 22.4 Continuing Public Involvement	
§ 201.6(c)(4)(ii): Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?	4.9 SMUD Capital Projects	
§ 201.6(d)(3): Was the plan revised to reflect changes in development?	2.2.3 Changes in Development	
§ 201.6(d)(3): Was the plan revised to reflect changes in priorities and progress in local mitigation efforts?	20.1 Progress of Mitigation Efforts 20.2 Change in Priorities	
§ 201.6(c)(5): For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance?	22.1 Plan Adoption	SMUD had a single-jurisdictional plan
§ 201.6(c)(5): For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance?	This is a single jurisdiction plan	This is a single jurisdiction plan
HHPD1: Did the plan describe the incorporation of existing plans, studies, reports, and technical information for HHPDs?	12.6 Dam Failure	

Table 1: 44 CFR Requirements Met		
44 CFR Requirement	**Sections in 2024-2028 HMP**	**Comments**
HHPD2: Did the plan address HHPDs in the risk assessment?	12.6 Dam Failure	
HHPD3: Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?	12.6 Dam Failure: Current Mitigation Efforts	
HHPD4: Did the plan include actions that address HHPDs, and prioritize mitigation actions to reduce vulnerabilities from HHPDs?	12.6 Dam Failure: Current Mitigation Efforts	

3.0 Planning Process

This section describes the first step of the HMP planning process - organize resources. Organizing resources includes building the core planning team, determining the outreach plan, and documenting review.

The planning process accomplished several critical HMP requirements, including identifying the Plan Area, defining general priorities, reviewing the capabilities of the communities within SMUD's Plan Area, and establishing stakeholder and community outreach and input process. Strategies in developing the continuity of public participation in plan maintenance were also established, as well as means of properly documenting all future changes and updates to the HMP.

3.1 Governance and Planning Team

SMUD's Enterprise Risk Management Office is responsible for updating the HMP, its Enterprise Risk Manager assumed the role of lead planner and leveraged SMUD's existing risk governance structure to assist in the update of this HMP. This governance structure includes Executive oversight, senior management steering committee, a core team, and a planning committee.

3.1.1 Executive Risk Oversight Committee (EROC)

The Enterprise Risk Oversight Committee (EROC) is made up of SMUD Executives and is chaired by the Chief Financial Officer who is responsible for enterprise-wide risk oversight. During the HMP process, the EROC is responsible for the oversight, direction.

Table 2: Executive Risk Oversight Committee (EROC)		
Name	**Title**	**Role**
Jennifer Davidson	Chief Financial Officer	Chair
Brandy Bolden	Chief Customer Officer	Member
Farres Everly	Chief Marketing and Communications Officer	Member
Frankie McDermott	Chief Operating Officer	Member
Jose Bodipo-Memba	Chief Diversity Officer	Member
Laura Lewis	Chief Legal and Government Affairs Officer and General Counsel	Member
Lora Anguay	Chief Zero Carbon Officer	Member
Scott Martin	Chief Strategy Officer	Member
Suresh Kotha	Chief Information Officer	Member

3.1.2 Risk Champion Network (RCN)

The Risk Champion Network (RCN) is a team of Directors who report directly to an Executive and represents various business areas across SMUD. The Core Team leverage this existing network to serve as the steering committee for this update. The RCN serves as a peer review group, providing input for the improvement of risk management practices across SMUD and drives risk informed decision making. Under the guidance of the Chief Financial Officer (CFO) and Chief Strategy Officer (CSO), the RCN promotes an interconnected risk management approach, assists in identifying common or overlapping risks, and encourages effective collaboration to streamline risk related activities across SMUD. During the HMP process, the RCN served as a senior leadership steering committee responsible for providing strategic direction, vetting activities being recommended to the EROC, and review of the HMP. Members of the RCN are outlined in table 3.

Table 3: Risk Champion Network (RCN)		
Name	**Title**	**Role**
Russell Mills	Director, Treasury and Risk Management	Chair
Antiwon Jacobs	Director, Cybersecurity	Member
Bryan Swann	Director, Resource Strategy	Member
Cara Chatfield	Director, Marketing and Corporate Communications	Member
Casey Fallon	Director, Procurement, Warehouse, and Fleet	Member
Lucas Raley	Interim Director, Line Assets	Member
Ellias van Ekelenburg	Director Environmental Safety and Real Estate	Member
James Leigh-Kendall	Director, Reliability, Compliance, and Coordination	Member
Joel Ledesma	Director, Power Generation	Member
Laurie Rodriguez	Director, People, Services, and People	Member
Tracy Carlson	Director, Customer Operations	Member

3.1.3 Core Team

The Core Team (CT) is a smaller team from core areas of the organization. They are responsible for project leadership, providing strategic direction to the planning team as agreed upon by Seniors Leaders via the EROC and RCN. They are also responsible for monitoring the progress of key project deliverables, making daily decisions about project course corrections, ensuring compliance with DMA 2000 requirements, and managing federal funding and scope change. Members of the project management team were also a part of the planning committee. CT members are identified in table 4.

Table 4: Core Team (CT)

Name	Title	Role
Toni Hoang	Enterprise Risk Manager	Project lead; alignment of HMP to enterprise risk management and business processes.
Joy Mastache	Senior Attorney	Legal lead; ensuring compliance with DMA and state requirements as well as strategic legal direction.
Patrick Garvey	Manager, Civil Engineer	Subject matter expert; alignment of HMP to operational plans and processes.
Daniel Driscoll	Supervisor, Health, and Safety	Subject matter expert; alignment of HMP to operations and processes.
Matthew Sisneros	Risk Management Analyst	HMP information coordination and HMP formatting.

3.1.4 Planning Committee

The Planning Committee (PC) consisted of key decision makers from many operational functions across SMUD. The PC directly contributed to project decision-making processes. This includes:

- Attending meetings.
- Collecting and providing requested data.
- Decisions on plan process and content.
- Development of mitigation actions for the HMP.
- Review and comment on plan drafts.
- Coordination of the public input process

The preparation of the HMP required a series of meetings intended to facilitate discussion and initiate data collection efforts among the business areas. More importantly, these meetings and workshops prompted continuous input and feedback throughout the process. Table 5 below provides a list of the HMP PC members.

Table 5: Planning Committee		
Date	**Title**	**Meeting Objective**
Anna Marie Will	Insurance Program Manager	Treasury & Risk Management
Antoinette Benson	Emergency Preparedness & Enterprise Continuity Program Manager	Facilities, Security Operations & Emergency Preparedness & Enterprise Continuity
Blake Richardson	Public Information Specialist	Corporate Communications
Brad Gacke	Rancho Seco Assets Manager	Nuclear Operations Fuel
Christopher Broyhill	Emergency Preparedness Specialist	Facilities, Security Operations & Emergency Preparedness & Enterprise Continuity
Dan Driscoll	Supervisor, Health & Safety	Environmental Safety & Real Estate
Daniel Stricklin	Manager Hydro Generation Assets	Hydro Generation Management
Darold Perry	Supervisor, Hydro License Implementation	Power Generation Design
Darrel Daniel	Vegetation Management Program Manager	Grid Assets
David Hanson	Project Manager II	Hydro Power Generation
David Lighten	Manager, Security Operations	Facilities & Security Operations
David Soule	GIS Systems Manager	Grid Planning & Operations
Dudley McFadden	Principal Civil Engineer	Hydro Generation Design
Eric Brown	Vegetation Management Manager	Grid Assets
Eric Hull	Regulatory Compliance Program Manager	Reliability and Compliance
Ernie Miller	Manager, Rancho Seco Assets	Power Generation Management
Francis Christensen	Gas Pipeline Assets Manager	Power Generation Management
Gary Ferguson	Strategic Business Planner	Community Relations Outreach & Support
Gretchen Hildebrand	Senior Land Specialist	Real Estate Asset Management
Hieu Nguyen	Principal Financial Accountant	Accounting
Jade Dorsey	Office Technician	Treasury and Risk Management
James Frasher	Manager Economic Development and Partnership	Zero Carbon Energy Solutions
Jenna Lesch	Manager, Customer Strategy & Operations	Customer & Community ServicesCare
John Larsen	Facilities Manager	Facilities
Jordan Monier	Fire Protection Specialist	Facilities and Security Operations
Josh Kretchman	Cybersecurity Program Manager	Information Technology
Joy Mastache	Senior Attorney	Legal Counsel
Joyce Hribar	Manager, Operational PMO	Zero Carbon Energy Solutions
Kathleen Ave	Senior Strategic Business Planner	Distributed Energy Strategy
Kim Rikalo	Manager, Program Delivery	Customer & Community Services
Lucas Raley	Interim Director Line Assets	Energy Delivery
Matthew Giovannoni	Dam Safety Engineer	Hydro Generation Design
Matthew Sisneros	Risk Management Analyst	Treasury & Risk Management

Table 5: Planning Committee		
Date	**Title**	**Meeting Objective**
Michelle Ramos	Program Manager, System Operations and Reliability	Transmission Planning & Operations
Parikshat Pathak	Supervising Principal Distribution Systems Engineer	Transmission & Distribution Maintenance Planning
Patrick Garvey	Manager, Civil Engineering	Substation
Ryan Von Sossan	Strategic Account Advisor	Community Development
Shiloh Costello	Manager, Sustainable Communities	Workforce, Diversity & Inclusion

3.1.5 Internal Meeting and Coordination

The various teams met throughout the planning and development of the HMP. Table 6 provides a summary of the meetings conducted throughout the planning process. Meeting documentation and other relevant handouts are provided in Appendix B.

Table 6: Meeting and Coordination Summary		
Date	**Team/Title**	**Meeting Objective**
August 24, 2023	Chief Financial Officer	Email to CEO and EROC on notice of award
August 29, 2023	Director, Treasury and Risk Management	Email to Directors on notice of award and resource needs
August 29, 2023	Enterprise Risk Manager	Email to Directors recommending subject matter experts (SMEs) to serve on planning committee
September 7, 2023	Risk Champion Network	HMP kick-off
September 11, 2023	Core Team	HMP kick-off and planning
September 14, 2023	Planning Team	HMP kick-off and planning
September 21, 2023	Communications Plan Meeting	Develop communications plan
September 25, 2023	Core Team	Review status of SME updates and meeting schedules
October 2023	Hazards Risk Review Meetings	Review and update hazard information and risk assessments
October 26, 2023	Planning Team	Mid-way check point
November 8, 2023	Risk Champion Network	Mid-way check point draft plan overview
November 10, 2023	Enterprise Risk Oversight Committee	Status update on HMP and draft plan review
November 16, 2023	Planning Team	Review and finalize HMP for public comment

3.2 Defining Planning Area

The Planning Team met to review the 2019 identified Plan Area and to determine changes appropriate to reflect the intent of this plan. SMUD's Plan Area geographically covers all areas where SMUD directly owns and/or has an ownership and/or operational share of critical infrastructure (hereinafter referred to as the Plan Area). These territories are mostly located in Sacramento, El Dorado, Placer, and Solano counties. However, other areas

where SMUD owns, is partial owner, or operates critical infrastructure includes small portions of Alameda, Colusa, Contra Costa, Fresno, Glenn, Kern, Kings, Merced, Modoc, San Benito, San Bernardino, San Joaquin, Santa Clara, Shasta, Siskiyou, Stanislaus, Sutter, Tehama, and Yolo counties. Current development does not impact SMUD's plan, SMUD will continue to assess any potential impacts from future developments.

3.3 Stakeholder and Agency Coordination

The Plan must provide an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as business, academia, and other private and non-profit interests to be involved in the planning process (44 CFR § 201.6(b)(2)).

Stakeholders (table 7) were invited to participate in the plan development via an email invitation on October 25, 2023. Throughout the year, SMUD staff works closely with local jurisdictions bodies in which infrastructure critical to SMUD's operations exist and with regulatory bodies having authority over such infrastructure. Stakeholders received an e-mail invitation to also participate in the review of SMUD's HMP.

A copy of the draft HMP was posted online during a public comment period. The public was invited to review and provide their input. The public comment period was from December 1, 2023, to January 2, 2024. Additionally, the public was given opportunities to provide comment at two duly noticed public meetings, the Board (name) Committee Meeting and Board Meeting on (dates)

Table 7: Stakeholder and Agency Outreach		
Organization Name	**Organization Name**	**Organization Name**
Alameda Community Development Agency	El Dorado County Planning and Building Department	Reclamation District #755
Alameda County Fire Department	El Dorado Hills Community Services District	Reclamation District #2111
Alameda County Medical Center	El Dorado County	Reclamation District #800
Alameda County Sherriff's Office – Homeland Security & Emergency Services	El Dorado Hills Fire Department	Reclamation District #9
Alameda General Services Agency	El Dorado Irrigation District	Roseville Fire Chief
Alameda Public Health	Elk Grove Police Department	Sacramento Area Sewer District
Alameda Public Works Agency	Elk Grove Public Works	Sacramento City Fire Chief
America River Flood Control District	Elk Grove Water District	Sacramento County
America's Plumbing Co.	Elverta Joint Unified School District	Sacramento County Department of Agriculture
Arcade Creek Recreation and Park District	Environmental Coalition for Water Justice	Sacramento County Department of Airports
Area West Engineers, Inc	ESRI	Sacramento County Department of Transportation
Army Corps of Engineers	Fair Oaks Recreation and Park District	Sacramento County Department of Waste Management and Recycling
Aroche Union School District	Fair Oaks Water District	Sacramento County Department of Water Resources
Ascent Environmental	Fairway Napa Valley Insurance Services	Sacramento County Environmental Compliance Supervisor
Cal OES	FEMA	Sacramento County Environmental Management Department
CalFire	Finance of America Companies	Sacramento County Office of Emergency Services
California Central Valley Flood Control Association	Folsom Fire Chief	Sacramento County Planning Department
California Department of Food and Agriculture	Foster Morrison Consulting	Sacramento County Principal Civil Engineer
California Department of Transportation	Fruitridge Vista Water District	Sacramento County Sheriff 's Department
California Department of Water Resources	GEI Consultants	Sacramento County Sustainability Manager

Table 7: Stakeholder and Agency Outreach		
Organization Name	**Organization Name**	**Organization Name**
California Department of Water Resources Maintenance Area 9	Gillum Consulting	Sacramento Metro Fire District
California Environmental Protection Agency	Glenn County Planning and Public Works Agency	Sacramento Metropolitan Air Quality Management District
California Highway Patrol	Glenn County Planning and Public Works Agency	Sacramento Police Department
California Public Utilities Commission Director	Golden State Water Company	Sacramento Regional Water Authority
California State University Sacramento	Greene and Hemly	Sacramento Suburban Water District
California-American Water Company	Greyscale LLC	Sacramento Tree Foundation
Carmichael Recreation and Park District	Herald Fire District	Sacramento-Yolo Mosquito & Vector Control
Carmichael Water District	Howell Consulting	SAFCA
Center Unified School District	ILS Committee – Campus Commons	Safe Credit Union
Central Valley Flood Protection Board	Jeffrey Beck Insurance Services	San Benito County
Citrus Heights Water District	JTS Engineering Consultants	San Benito County Office of Emergency Services
City of Citrus Heights	Kaiser Permanente	San Bernadino County
City of Colusa	Kay Dix.	San Joaquin County
City of Elk Grove	KSN Inc.	San Jose Planning Department
City of Folsom	Larkspur Financial Services	Santa Clara County
City of Galt	Larsen Wurzel & Associates, Inc.	SBC Global Services
City of Galt Public Works	Live Oak Building Department	Shasta County Public Works
City of Isleton	Los Rios Community College District	Siskiyou County Office of Emergency Services
City of Placerville	Markin Family Properties LLC	Solano County Building Official
City of Placerville Police Chief	MBK Engineers	South Lake Tahoe Fire Chief
City of Rancho Cordova	Merced County HMP Lead	South Placer Fire Chief
City of Roseville	Modoc County Office of Emergency Services	Southgate Parks and Recreation
City of Sacramento	Modoc Sheriff	Stanislaus County Office of the Fire Warden
City of Sacramento Office of Emergency Services	National Oceanic and Atmospheric Administration	State Fire Marshall
City of Sacramento Police Department	Natomas Central Mutual Water Company	Stockton Fire Chief
City of South Lake Tahoe Fire Department	National Weather Service	Styrsky Insurance Agency

Table 7: Stakeholder and Agency Outreach		
Organization Name	**Organization Name**	**Organization Name**
City of Vacaville	Office of Wildfire Preparedness and Resilience (OWPR)	Sutter Buttes Flood Control Agency
City of Vacaville Community Development Department	Olson Construction Inc.	Sutter County Emergency Management
City of Vacaville Department of Utilities Administration	Orange Vale Water Co.	Sutter County Fire Chief
City of Vacaville Fire Department	Pacific Coast Banking School	Sutter County Planning Manager
City Public Works Vacaville	Peden Properties	Sutter County Public Works
CivicWell	Placer County	Tehama County Board of Supervisors (District 3)
CMS Plumbing	Placer County Office of Emergency Services	Tehama County Public Works Department
Comcast	Porta Bella International	Tehama County Sheriff's Office/ Office of Emergency Services
Community Link Capital Region	Rancho Murieta Community Services District	Trinchero Family Estates
Cosumnes Fire Department	Reclamation District #1000	Twin Rivers Unified School District
County of Colusa Office of Emergency Services	Reclamation District #1002	UC Davis
County of Sacramento Office of Emergency Services	Reclamation District #1601	United States Forest Service
County of Sacramento Water Resources	Reclamation District #2110	Valley Vision
Courtland Fire Department	Reclamation District #3	VG Consulting
CSUS Emergency Management	Reclamation District #317	Wagner & Bonsignore, CCE
CWO-Law	Reclamation District #341	Walnut Grove Fire District
DCC Engineering	Reclamation District #349	Woodside Homeowners Association
Del Paso Manor Water District	Reclamation District #369	Yolo County
Dennis. G. Chappabitty (Attorney at Law)	Reclamation District #407	Yolo Fire Chief
EBI Consulting	Reclamation District #551	Yuba City Fire Department
El Dorado County Department of Transportation	Reclamation District #554	Yuba City Public Works
El Dorado County Fire Safe Council	Reclamation District #563	Yuba County
El Dorado County Office of Emergency Services	Reclamation District #744	Yuba County Public Works Department

3.4 Regional Participation

SMUD regularly participates in regional and local forums to collaborate on shared interest in various risks, emergency response and mitigation planning, and information sharing. These meetings are generally open meetings that include public input. Information from these meetings was used to inform, identify, and prioritize risks in this HMP. Table 8 summarizes examples of this participation.

SMUD's government affairs team is engaged in several efforts with regional stakeholders to discuss various hazards and climate resilience. These meetings are not public meetings. SMUD government affairs have also participated in discussions about regional climate resiliency with a group comprised of SACOG, AQMD, SacRT, SAFCA, RWA and El Dorado County Fire Council over the last year. These are not public meetings.

The SMUD Emergency Operation Center (EOC) may participate in planning exercises with other EOCs and first responders, those exercises are not a public forum.

Table 8: Regional Participation		
Organization	**SMUD's Role**	**Description**
California Utilities Emergency Association (CUEA)	Board of Director	• Established in 1952, CUEA is the largest utility emergency association in California. CUEA is located inside the State Operations Center (SOC) in Mather, California. • CUEA serves as the point of contact for critical infrastructure utilities, Cal OES, and other governmental agencies, before, during and after an event to facilitate. communications and cooperation between member utilities and public agencies and with non-member utilities. • CUEA provides emergency response support whenever necessary for electric, petroleum pipeline, telecommunications, gas, water, and wastewater utilities. • CUEA supports utility emergency planning, mitigation, training, exercises, and education. • Under an established Memorandum of Understanding (MOU), CUEA both staffs and manages the State of California Utility Operations Center (UOC). CUEA is intended to provide support to the state. It serves as an active operational component of the State Operations Center (SOC) and Regional Emergency Operations Centers (REOCs) acting in the capacity of the Utilities Branch within the Operations Section. The SOC and REOC activate under the authority of California Standardized Emergency Management System (SEMS).

Table 8: Regional Participation		
Organization	**SMUD's Role**	**Description**
Capital Region Climate Readiness Collaborative (CRC)	Board Chair	• CRC is a multidisciplinary network of local and regional agencies, organizations, businesses, and associations working together to advance climate mitigation and adaptation efforts in each of their own communities throughout California's Capital Region (El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba communities). • The goal of the CRC is to assist in the creation of an environment in which stakeholders from across different markets and jurisdiction boundaries can come together for regional cooperation in finding solutions to address shared challenges of drought, extreme heat, extreme weather events, wildfires, and more.
El Dorado County Fire Safe Council (EDCFSC)	Board of Director	• Established in 2001, the mission of EDCFSC is to protect the people of El Dorado County and their property from the effects of catastrophic wildfire with education, cooperation, innovation, and action.
North American Transmission Forum (NATF)	Member; Leads the vegetation management core team	• NATF members include investor-owned, state-authorized, municipal, cooperative, U.S. federal and Canadian provincial utilities. • NATF members share timely information, including lessons learned, to help improve the reliability and resiliency of the electric transmission system.

Table 8: Regional Participation		
Organization	**SMUD's Role**	**Description**
California Public Utility Commission (CPUC) fire threat map	Member of the Peer Development Panel (PDP)	• The CPUC initiated a proceeding to develop a statewide map depicting areas of elevated and extreme fire risk in California—the "High Fire Threat District." • A multistep process was used to develop the statewide CPUC High Fire Threat District, including input from investor owned and publicly owned electric utilities, communications infrastructure providers, public interest groups, and local public safety agencies, California Department of Forestry and Fire Protection (CalFire), and other stakeholders. The map areas were available to the public for review and comment prior to approval. Primary responsibility for the development of the CPUC Fire Threat Map was delegated to PDP, a group of utility fire planning experts, and the Independent Review Team led by CalFire.

3.5 Public Involvement

The public must have had an opportunity to be involved in the current planning process during the drafting stage and prior to plan approval. The plan must document what the participation entailed, including how under-resourced communities and vulnerable populations within the planning area were provided an opportunity to be involved. The plan must document how public feedback was included throughout the planning process (44 CFR § 201.6(b)(1)).

3.5.1 Strategy

The Planning Team reviewed SMUD's 2019 public involvement and identified a strategic approach to public involvement for the 2024-2028 HMP. This strategic approach was focused on:

- information sharing with the public on HMP planning and drafting process,
- having materials available at public outreach events for the general public with a focus on vulnerable communities, and
- updating SMUD's HMP to reflect public outreach activities and participation.

3.5.2 Public Notice

SMUD provided notice in local newspapers during the planning stage and the draft review stage to welcome public input regarding the HMP update. These notices were published in the Sacramento Bee and the Mountain Democrat on the following dates: October 16, 2023, and December 1, 2023.

3.5.3 Public Events

SMUD leveraged its existing community outreach process and incorporated HMP update information sharing as part of community outreach events and communications. HMP information was available to attendees and SMUD staff was present to answer questions from the public and share information on the HMP website and email. Table 9 shows public events and communications that SMUD participated in.

Table 9: Public Events and Communications

›Date	Description	Location	Type
10/28/2023	International Auto Show	Cal Expo	Community event
10/28/2023	Golden Harvest Parade & Festival	Downtown Sacramento	Community event
10/28/2023	The Hamptons: Autumn Festival	Natomas	Community event
10/28/2023	Mutual Assistance Network Harvest Festival	Roberson Community Center	Community event
10/28/2023	Climate Justice Festival	Roberson Community Center	Community event
10/28/2023	GNNA Dia de los Muertos	Stanford Settlement Neighborhood Center	Community event
10/29/2023	International Auto Show	Cal Expo	Community event
10/29/2023	ARTners Dia de los Muertos	Elk Grove	Community event
10/29/2023	Ankur Fall Festival	Downtown Sacramento	Community event
10/31/2023	Higher Heights Trunk or Treat	Arden Arcade	Community event
11/2/2023	LCAC Dia de los Muertos	Old Sacramento	Community event
11/4/2023	Sacramento Republic FC: Western Conf. Finals	Cal Expo	Community event
11/4/2023	Midtown Farmer's Market	Downtown Sacramento	Community event
11/4/2023	Broadway International Festival	Downtown Sacramento	Community event
11/4/2023	Latino Book & Family Festival	Meadowview	Community event
11/4/2023	Special Olympics	Cherry Island Soccer Complex	Community event
11/5/2023	Special Olympics	Cherry Island Soccer Complex	Community event
11/5/2023	1Love 1Heart Block Party	Oak Park	Community event
11/5/2023	Run the Parkway	American River Parkway	Community event
11/5/2023	Diwali Festival of Lights	Rancho Cordova	Community event
11/11/2023	Midtown Farmer's Market	Downtown Sacramento	Community event

3.5.4 Hazard Mitigation Plan Website and E-mail

During the development of SMUD's 2019 HMP, SMUD staff established a dedicated webpage and email to share information on SMUD's HMP. This webpage will continue to serve as a central location to keep the public apprised of upcoming outreach events, meeting dates and times, and the plan update process (see table 11). The webpage address is: smud.org/HazardMitigation and the email address is: ERM@smud.org. The webpage and email were included in all public notifications, public presentations, and outreach materials.

3.5.5 Public Comments on Draft Plan

In addition to the listed organizations in table 7, a draft copy of the HMP was made available to the public for review. The public was given opportunity to comment on the draft HMP.

- The draft HMP was made available on SMUD's website (smud.org) for public review from December 1, 2023, to January 2, 2024. Public comments are addressed in the final HMP.
- SMUD also provided an opportunity for public comments on the draft HMP at a regularly scheduled Finance and Audit Committee Board Meeting[1].
- There were no comments received through the public review period.

SMUD Board Committee meetings are open and accessible to the public. Meeting notices and agendas are posted, at minimum, 72 hours in advance at the SMUD office and on SMUD's website. Those who are unable to attend the meeting in-person can livestream the meeting or view a recording on SMUD's website.

SMUD is committed to public participation. In accordance with California open meeting laws (California Government Code Sections 54960 et. seq.) SMUD Board meetings are open to the public and the public is invited to comment at these meetings. The public will continue to be involved in future HMP updates. Prior to adoption of formal updates, SMUD will provide the opportunity for the public to comment on the updates. A public notice will be posted prior to the meeting to announce the comment period and meeting logistics.

3.6 Existing Documents and Programs

The plan should describe the review and incorporation of existing plans, studies, reports, and technical information (44 CFR § 201.6(b)(3)). Linking existing plans and policies to the HMP helps to identify which resources already exist that can be used to implement the action items identified in the plan.

SMUD's plan includes a range of recommended action items that, when implemented, could reduce the Plan Area's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of SMUD's existing plans and policies. Table 10 accounts for the plans and policies already in place in SMUD's Plan Area that were reviewed or incorporated as a part of the HMP planning process:

[1] The Finance and Audit Committee Board Meeting was held on (October 2, 2018) at 5:30 P.M. at 6301 S Street, Sacramento, CA 95817

Table 10: Existing Plans Reviewed and Incorporated			
Title	**Version**	**Author/Owner**	**Description**
El Dorado County HMP Annex	2018 El Dorado MJ-HMP	El Dorado County and other agencies including SMUD	The Annexation Plan is a supplement to the 2017 El Dorado MJ-HMP. The purpose of the Annexation Plan is to identify specific hazards and mitigation strategies associated with the Upper American River Project (UARP) that may minimize the negative effects of such hazards on residents and property in the county, including SMUD's critical energy infrastructure.
El Dorado County Community Wildfire Protection Plan	2017	El Dorado Country Fire Safe Council	The El Dorado County Community Wildfire Protection Plan identifies risks, hazards, and past strategies for wildfire in the El Dorado County area.
Sacramento County HMP	2022	Sacramento County	SMUD participated along with various other Sacramento region stakeholders in the development of Sacramento County's HMP.
Emergency Operations Plan	2020	SMUD	SMUD maintains an emergency operations plan which addresses SMUD's preparedness and response policies and procedures for responding to, and recovering from, extraordinary emergency situations that could adversely affect business continuity and the capacity to safely generate, transmit, and distribute electric power to its customers.
SMUD Business Continuity Plans	2023	SMUD	Department Business Continuity Plans outline various measures for minimizing, mitigating, responding to, and recovering from events that can disrupt normal operations.
Climate Readiness Assessment and Action Plan		SMUD	The Climate Readiness Assessment and Action Plan is a continuation of SMUD's existing climate change resiliency research and readiness planning. The purpose of the Plan is to discuss and provide a map of at-risk assets due to climate stressors. The Plan also provides SMUD's ongoing action plan to address climate risks, including community engagement, enterprise-wide programs, capital investments and operational initiatives.

Table 10: Existing Plans Reviewed and Incorporated			
Title	**Version**	**Author/Owner**	**Description**
Hydro Dam Failure Emergency Action Plan (EAP)		SMUD	The Dam Failure EAP identifies roles and responsibilities and describes methods used to identify unusual and unlikely conditions that may endanger SMUD's hydropower dams in time to take mitigating action. As required by state and federal regulations, the EAP is reviewed annually and rewritten every five years, most recently in 2020.
Rancho Seco Dam EAP		SMUD	The Rancho Seco Dam EAP describes responsibilities for responding to a potential or actual failure of the dam. It includes facts about the dam and maps showing areas at risk of flooding following a dam failure, useful for emergency responders to direct resources. As required by the state regulator, the plan is reviewed annually and rewritten quinquennially.
Gas Pipeline Operations (GPO) EAP		SMUD	The GPO EAP addresses the delegation of responsibilities and the necessary procedures for safeguarding life and property while maintaining or restoring service in natural gas emergencies. The GPO EAP covers situations such as free gas detected in or near buildings, fire, or explosion near or involving the pipeline facilities, dig-ins, facility failures, insufficient pressure, and natural disasters or civil disturbances or potentially involving the pipeline facilities. This plan is reviewed and updated annually
GPO Preventative and Mitigative Measures		SMUD	The GPO Preventative and Mitigative Measures document describes the process for developing preventative and mitigative measures employed through SMUD's Gas Pipeline Integrity Management Program. The intent of preventative and mitigative measures are to ensure public safety by preventing pipeline incidents and minimizing the impact of any potential pipeline incident.

Table 10: Existing Plans Reviewed and Incorporated			
Title	**Version**	**Author/Owner**	**Description**
Wildfire Mitigation Plan	2023-2025	SMUD	A 3-year wildfire mitigation plan that is reviewed and updated annually. The goal of the plan is to: • Minimize the probability that SMUD's transmission and distribution (T&D) system may be the origin or contributing source for the ignition of a wildfire; • Implement a wildfire mitigation plan that embraces safety, prevention, mitigation, and recovery as a central priority for SMUD; and • Create a WMP that is consistent with state law and objectives.
2030 Zero Carbon Plan	2021	SMUD	The 2030 Zero Carbon Plan is a flexible road map to achieve SMUD's zero carbon goal while ensuring all customers and communities it serves reap the benefits of decarbonization.

Other Related Plans Specific to Fire Hazards

- United State Forest Service (USFS), Bureau of Land Management (BLM), CalFire, and other agency land use and resource management plans that may apply to the area,
- Fire Management, fire prevention, fire response, and fuel management plans prepared for local agencies,
- Agency management goals for implementation of fire prevention and response actions,
- Fire prevention and response plans prepared by other utilities to satisfy their FERC license requirements, and
- Fire behavior literature and scientific publications.

3.7 Plan Milestones

Several stakeholders, including public and private agencies, participated in the HMP planning process. Table 11 highlights some major milestones.

Table 11: Plan Milestones

Date	Title	Description	Attendance
Sept. 7, 2023	RCN Meeting #1	• RCN input • Project overview, work plan, timeline, important milestones • RCN's roles and responsibilities • Discuss plan review, public outreach capabilities • Confirm natural hazards of interest	In – person
Sept. 11, 2023	Core Team Meeting #1	• Project overview, timeline, important milestones • Core Team roles and responsibilities • Discuss plan review, public outreach process • Confirm hazards and Subject Matter Experts (SMEs) • Next Steps with Planning Team and coordination of communication with RCN and EROC	Teams
Sept. 14, 2023	Planning Team Meeting #1	• Project overview, timeline, important milestones • Core Team roles and responsibilities • Discuss plan review, public outreach process • Confirm hazards and Subject Matter Experts (SMEs)	Teams
Oct.16, 2023	Public outreach	Press release announcing the planning process, website, and email address inviting the public to participate in the planning process.	Sacramento Bee and Mountain Democrat
Oct. 25, 2023	Stakeholder outreach	E-mail and flier sent to stakeholders in table 7 announcing the update process and inviting stakeholders to participate in the planning process.	E-mail
Oct. 26, 2023	Planning Team Meeting #2	• Status update on work and outline action items for completing draft 1.	Teams

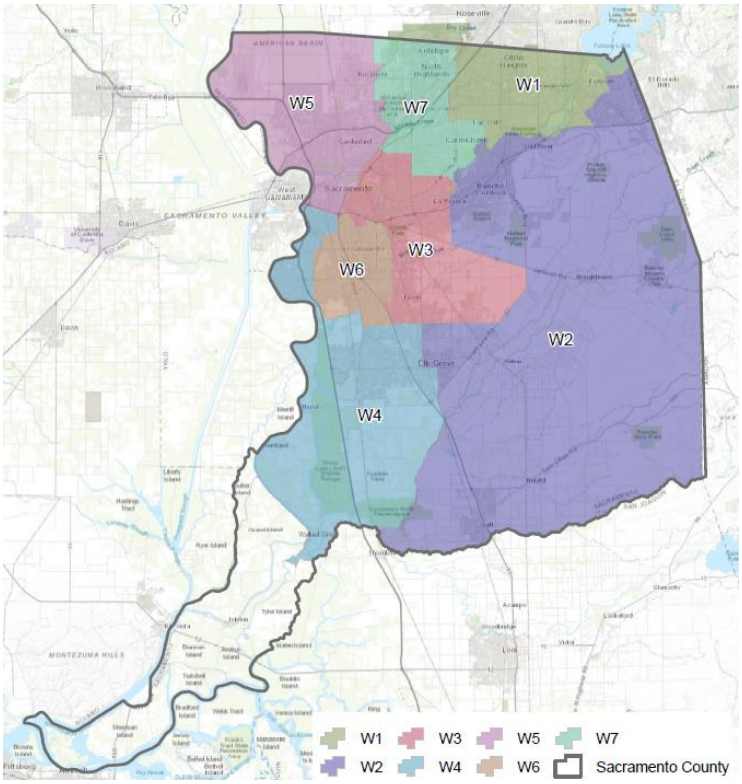
Table 11: Plan Milestones			
Date	**Title**	**Description**	**Attendance**
Nov. 8, 2023	RCN Meeting #2	• Draft Plan overview • Approve hazard response action plan • Discuss any public comments and plan integration • Overview of changes in 2024-2028 HMP Update	In – person
Nov. 10, 2023	EROC Meeting #1	• Status update on 2024-2028 HMP activities • Discuss any public comments and plan integration • Overview of changes in 2024-2028 HMP Update	Teams
Dec. 1, 2023	Public outreach	Press release announcing the beginning of the draft plan public comment period	Sacramento Bee and Mountain Democrat
Dec. 1, 2023	Stakeholder outreach	Email to stakeholders in table 7 inviting them to participate in the review of the draft plan	E-mail
	Public outreach	The public was given an opportunity to provide additional comments on the plan at the Board Committee Meeting	In – person and virtual
TBD	Submittal	Plan submitted to CalOES for review	e-mail
TBD	Approval pending adoption	Approval pending adoption received from FEMA	
TBD	Plan adopted by SMUD Board of Directors	Plan is finalized with SMUD Board's adoption	
TBD	Final approval from FEMA	FEMA approval after SMUD Board adoption	

4.0 Planning Process

4.1 About SMUD

Headquartered in Sacramento, California, SMUD owns and operates an electric system that has provided retail electric service since 1946. SMUD generates, transmits, and distributes electricity within a 900-square-mile territory that includes the principal parts of Sacramento County, and a small adjoining portion of Placer County, see figure 1.

Figure 1: Map of SMUD's Service Territory by Ward



SMUD is the nation's sixth-largest community-owned electric utility, recognized internationally for its innovative energy efficiency programs and use of renewable power technologies. As a municipal utility, SMUD is governed by a seven-member popularly elected Board of Directors that determines policy and appoints the Chief Executive Officer and General Manager who is responsible for SMUD's overall management and operations. Today, SMUD's power supply is on average about 54 percent[2] carbon free and SMUD has a goal to reach zero carbon in its electricity production by 2030.

4.2 The Service Area

SMUD is the primary distributor of electric power within an area of approximately 900 square miles in central California. The service area includes Sacramento, the State Capital, the populous areas principally to the northeast and south of the City of Sacramento and the agricultural areas to the north and south.

SMUD's electric system supplies power to a population of approximately 1.5 million with a total annual retail load of approximately 10,622 million kilowatt hours (kWh) for the year ended December 31, 2022. As the capital of the nation's most populous state, Sacramento benefits from the historically stabilizing influence of a large government sector.

[2]SMUD, *2022 Power Content Label*, smud.org/SMUDPCL, October 25, 2023.

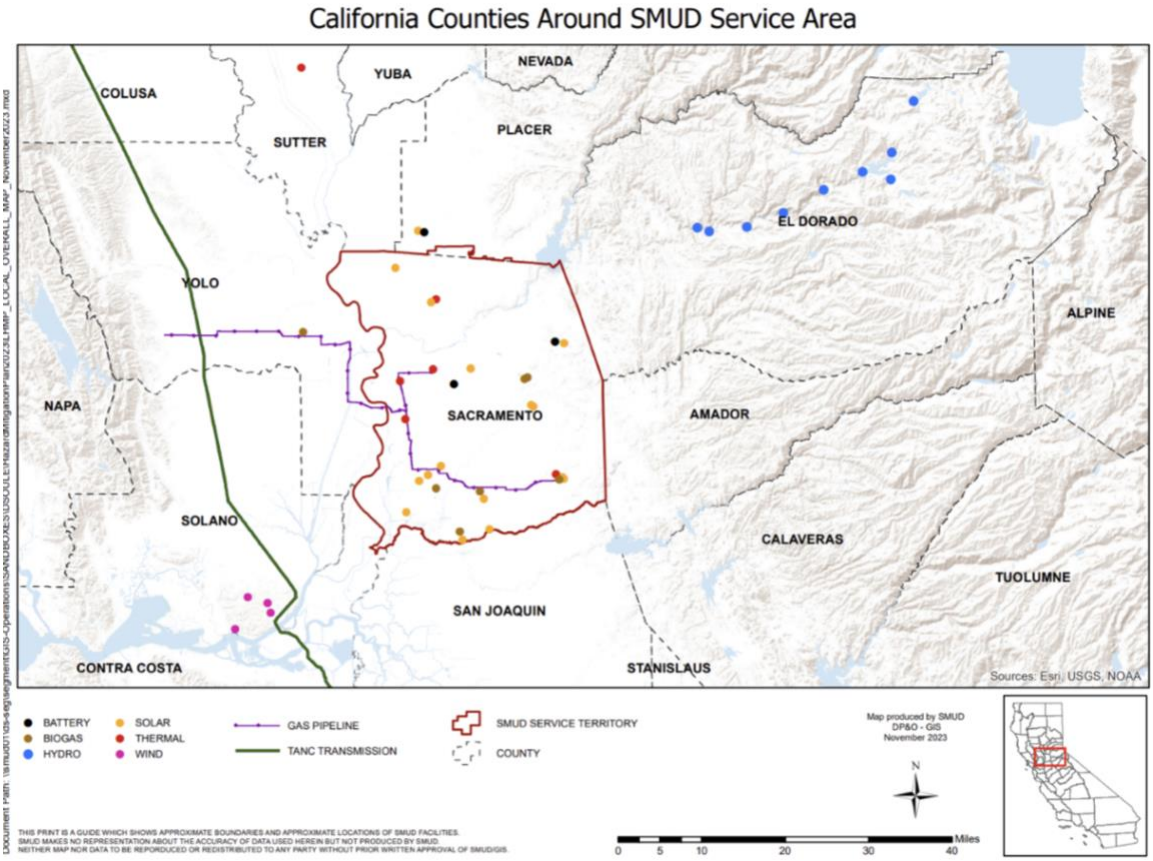
Sacramento is home to the State government headquarters, the Sacramento County seat, the city government and various special districts that combine to make government the largest single employment sector in the Sacramento area. Information technology, transportation, education and health services, leisure and hospitality and construction serve as the other major sectors of employment and industry in the area.

SMUD's annual peak load has averaged 3,113 Megawatts (MW) over the three years 2020-2022, with SMUD's record peak load of 3,299 MW occurring on July 24, 2006. In 2022, SMUD recorded its second highest peak load of 3,292 MW. SMUD reviews its load forecast, at a minimum, on an annual basis.[3] Current and historical load statistics can be found at our website: smud.org/en/Corporate/About-us/Company-Information/Reports-and-Statements

Figure 2: California Counties around SMUD Service Area (Northern California)

[3] Electric Revenue Bonds, 2023 Series K Official Statement, Page A-4, June 6, 2023.

Figure 3: SMUD Generation Resources



4.3 Purpose and Vision

SMUD's Board of Directors has established the following purpose and vision statements: "SMUD's purpose is to enhance the quality of life for our customers and community by providing reliable and affordable electricity, and leading the transition to a clean energy future." "SMUD's vision is to be a trusted and powerful partner in achieving an inclusive, zero carbon economy. SMUD will leverage its relationships to accelerate innovation, ensure energy affordability and reliability, protect the environment, eliminate greenhouse gas emissions, catalyze economic and workforce development, promote environmental justice, and enhance community vitality for all."

4.4 Goal And Objectives

For more than 70 years, SMUD has provided safe, reliable and affordable electricity, excellent customer service, community value, innovation, and environmental leadership to its customers.

The Board has adopted a set of Strategic Directions (SD) with related metrics, which it considers essential in the continued success of the organization and its service to its customers. These include safety, reliability, competitive rates, Enterprise Risk Management, access to credit markets, customer relations, environmental leadership, and

resource planning. SMUD's Board SDs guide in the decisions we make about SMUD's policies and operations. The Board continually reviews and refines these guidelines to make sure it meets its customer's energy needs both now and in the future.

4.5 SMUD Priorities

Multiple risks and hazards have the potential to impact SMUD's operations. SMUD addresses these risks and hazards as a part of its ongoing Enterprise Risk Management and Insurance Programs activities and includes them in the capital investment prioritization process. Historical data indicates that wildfire, storms, floods, and earthquakes account for the greatest losses incurred by SMUD and should be designated as priority threats. In addition, climate change has the potential to increase the impacts of these hazards as well as others.

4.6 The Electric System

SMUD owns and operates an integrated electric system that includes generation, transmission, and distribution facilities. SMUD delivers energy to its customers from a variety of sources. The sources include large hydropower, natural-gas-fired generators, renewable energy (solar, wind, small hydro, geothermal, and biomass), and power it purchases on the wholesale market. The largest single source of power for SMUD is the Cosumnes Power Plant (described below). SMUD's UARP is its cleanest and most economical power source.

4.6.1 The Distribution and Transmission System, Sacramento County

SMUD supplies power to its bulk power substations through 230 kilovolt (kV) and 115 kV transmission systems. This system transmits power from SMUD's generation plants, and interconnects with Pacific Gas & Electric ("PG&E") and the Western Area Power Administration (WAPA). Power is distributed throughout Sacramento County via a 69 kV sub-transmission system except for the Sacramento downtown area, which is served from the 115 kV transmission systems. The downtown area is served from 115/12 kV and 115/21 kV substations. The distribution system serving the remainder of SMUD's service territory is comprised of 69/12 kV and 69 kV substations with overhead and underground distribution circuits.

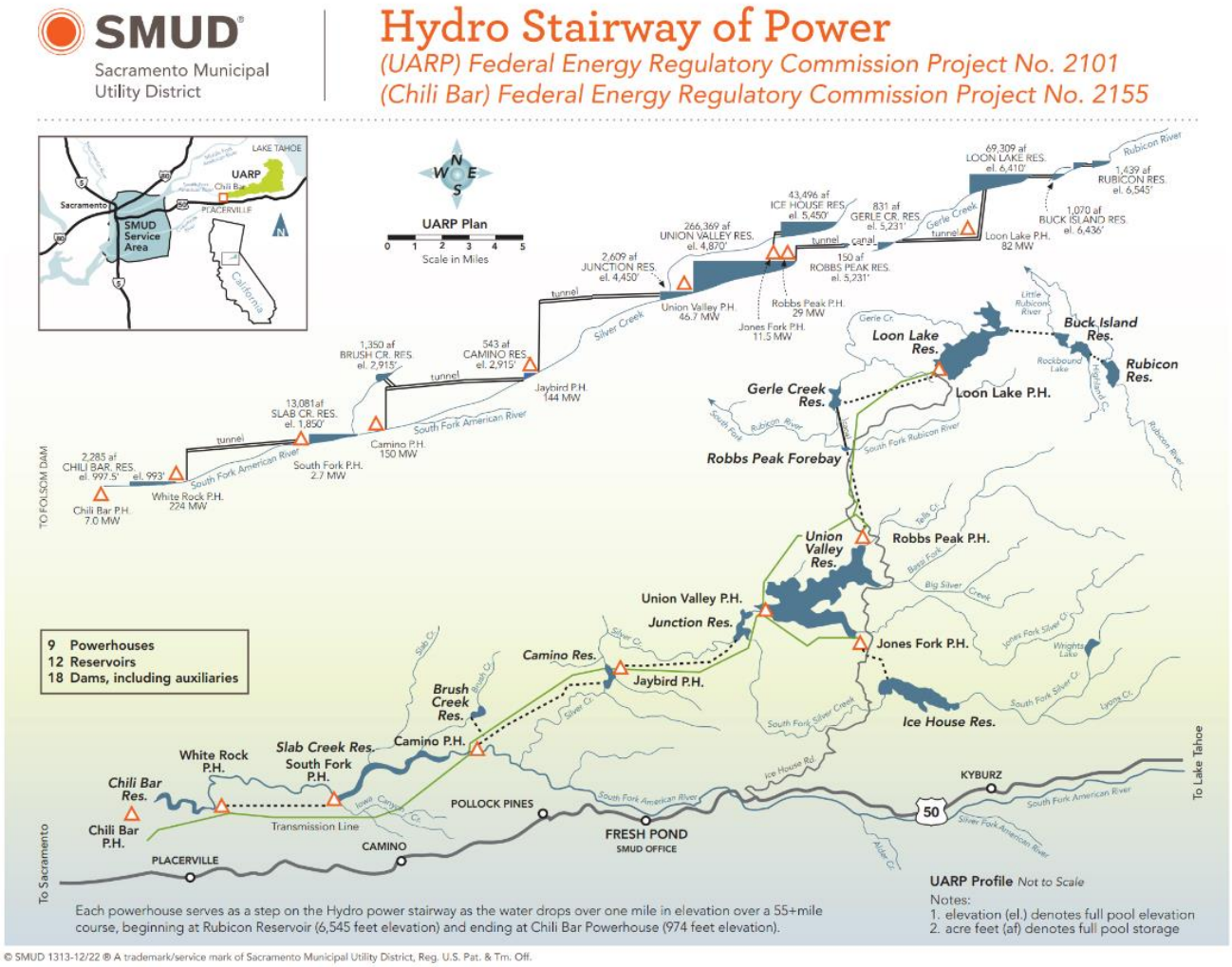
4.6.2 Hydroelectric System

SMUD's hydroelectric system includes nine SMUD-owned and operated hydroelectric powerhouses rated at approximately 700MW in the Western Sierra Nevada Mountain region. The hydroelectric systems span approximately 50 miles with the highest elevation reservoir at Rubicon Reservoir and descends the mountain range terminating at Chili Bar Powerhouse. All total there are nine hydroelectric powerhouses with seven of them interconnected with dedicated 69kV and 230kV transmission lines. The remaining two hydroelectric powerhouses South Fork and Chili Bar are interconnected directly into PG&E's 12kV and 21kV local distribution systems. Approximately twenty linear miles of overhead 230kV transmission lines connect the hydroelectric system to SMUD's service area near Folsom. The hydroelectric powerhouses are fed from the various dam-formed

reservoirs in the area. A small dedicated 4kV distribution system serves various valve and gate control houses for the reservoirs, a ranger station, a ski chalet, and a communication station. The 4kV distribution system is approximately five circuit miles in length. The 4kV system is not interconnected with PG&E's distribution system that serves the area.

In addition to providing clean hydroelectric power and operating flexibility for SMUD, the UARP area provides habitat for fish and wildlife and a variety of recreational opportunities, including camping, fishing, boating, hiking, horseback riding, mountain biking and cross-country skiing, 52 developed recreation sites include campgrounds, day use facilities, boat launches, trails and a scenic overlook. Many of these developed recreation sites, as well as dispersed recreation areas within or immediately adjacent to the Project Boundary facilities, are accessed via one lane rural roads.

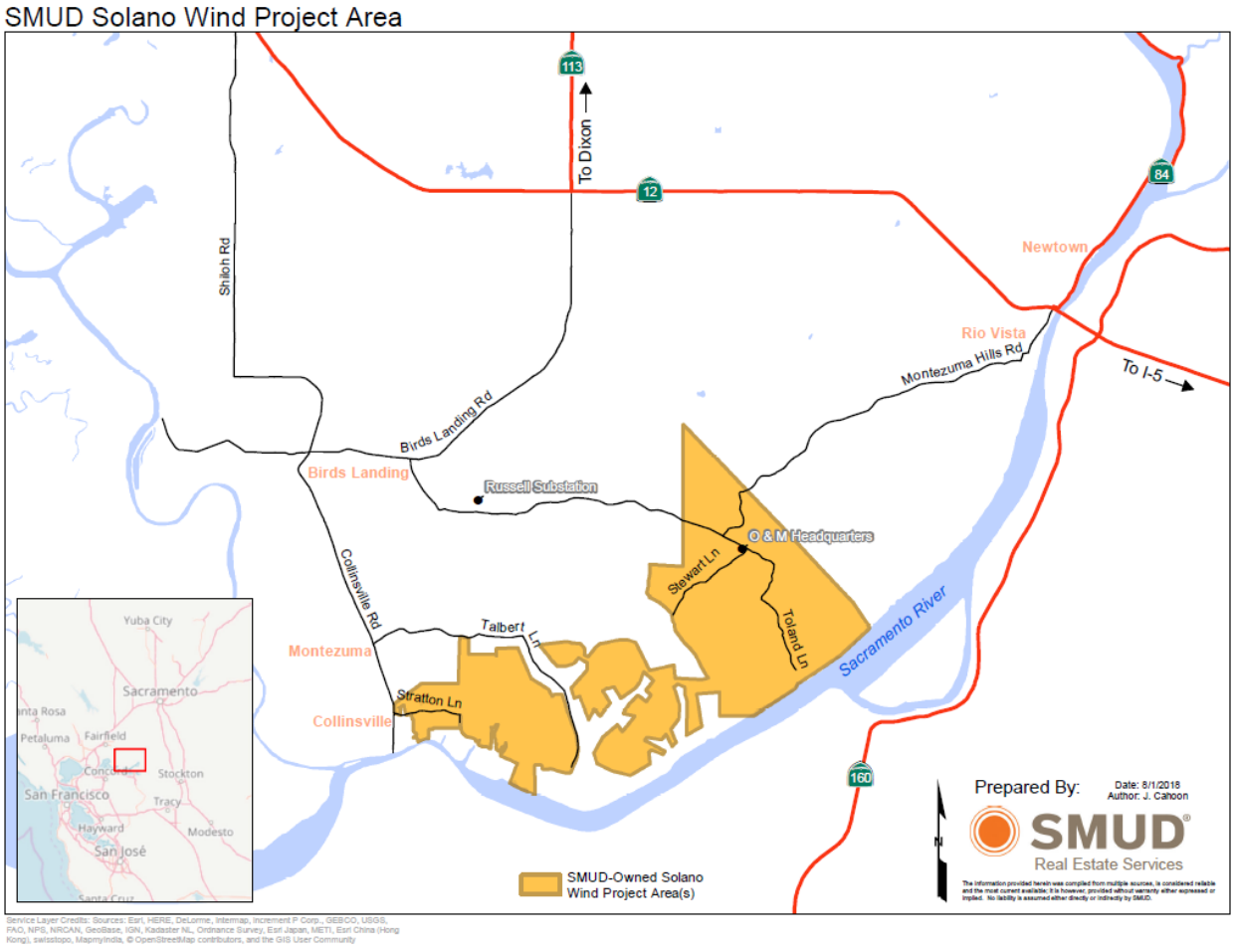
Figure 4: Map of UARP



4.6.3 Wind Power

SMUD owns and operates a 300MW wind project, located in Solano County, known as The Solano Wind Project. The project consists of 103 wind turbine generators (WTG) spanning five miles southwest of Rio Vista. Energy from the project is collected at 21kV and 35kV and transmitted over a dedicated overhead and underground system to Russell substation. At Russell substation, the energy is stepped up to 230 kV and interconnected to PG&E's Birds Landing Switching Station.

Figure 5: Solano Wind Project



4.6.4 Solar Photovoltaic

SMUD owns and operates approximately 1.5 MW of solar photovoltaic generating facilities. These facilities include installations at the Hedge Substation property, the Customer Service Center, the East Campus Operations Center, and other smaller photovoltaic systems throughout the service area on parking lots.

4.6.5 Local Gas-Fired Plants

SMUD owns five local natural gas-fired plants in its service area: the Central Valley Financing Authority (CVFA) Project, the Sacramento Cogeneration Authority (SCA) Project, the Sacramento Power Authority (SPA) Project, SPA McClellan and the SFA Project (each defined below). These five plants are referred to collectively as the "Local Gas-Fired Plants." These plants are a strategic component of SMUD's resource mix. In addition to providing SMUD a total capacity of approximately 1,012 MW, the Local Gas-Fired Plants provide SMUD with needed voltage support, operational and load following capability, and the reliability inherent in having power resources located close to loads. Table 12 provides an overview of the five Local Gas-Fired Plants.

Table 12: Local Gas-Fired Plants

Name	Capacity	Type	Description
The Cosumnes Power Plant (the "SFA Project")	495 MW	Natural gas-fired, combined cycle plant	Located in the Southern portion of Sacramento County, adjacent to SMUD's decommissioned Rancho Seco Nuclear Power Plant.
The CVFA Carson Cogeneration Project (the "CVFA Project")	103 MW	Natural-gas-fired cogeneration project consisting of separate combined cycle and peaking plants	Provides steam to the Sacramento Regional County Sanitation District ("SRCSD") wastewater treatment plant adjacent to the site.
The SCA Procter & Gamble Cogeneration Project (the "SCA Project").	182 MW	Natural gas-fired cogeneration facility	Located in an established industrial area of Sacramento. The SCA Project produces steam for use in Procter & Gamble Manufacturing Company's oleo chemical manufacturing processes and electricity for sale to SMUD.
The SPA Campbell Soup Cogeneration Project (the "SPA Project")	180 MW	Natural gas-fired cogeneration project	Located in Sacramento, adjacent to the Capital Commerce Center (formerly the Campbell Soup Company food processing facility).
The SPA McClellan Gas Turbine ("SPA McClellan")	72 MW	Natural gas-fired simple cycle combustion turbine generating	Located at McClellan Business Park in Sacramento. The turbine is connected to SMUD's electric system and is operated to meet SMUD's peak-load requirements. SPA McClellan is aligned for remote starting and operation with both black start and fast start capabilities.

4.6.6 Transmission

The transmission system carries electricity from generation to the distribution system over long distances at high voltages. SMUD supplies power to its bulk power substations through a 230 kV and 115 kV transmission systems. This system transmits power from SMUD's generation plants, other than the Solano Wind Project, and interconnects with Pacific Gas & Electric (PG&E) and the Western Area Power Administration (WAPA). Power is distributed throughout Sacramento County via a 69 kV sub-transmission system except for the Sacramento downtown area, which is served from the 115 kV transmission systems. The downtown area is served from 115/12 kV and 115/21 kV substations.

4.6.7 Distribution

Distribution systems move power from transmission to end use customers. The distribution assets consist of thousands of unique parts that are customary and usual for the operation of electric distribution systems. The distribution system serving the remainder of SMUD's service territory is comprised of 69/12 kV and 69/4 kV substations with overhead and undergrounds distribution circuits.

4.7 Gas Pipeline

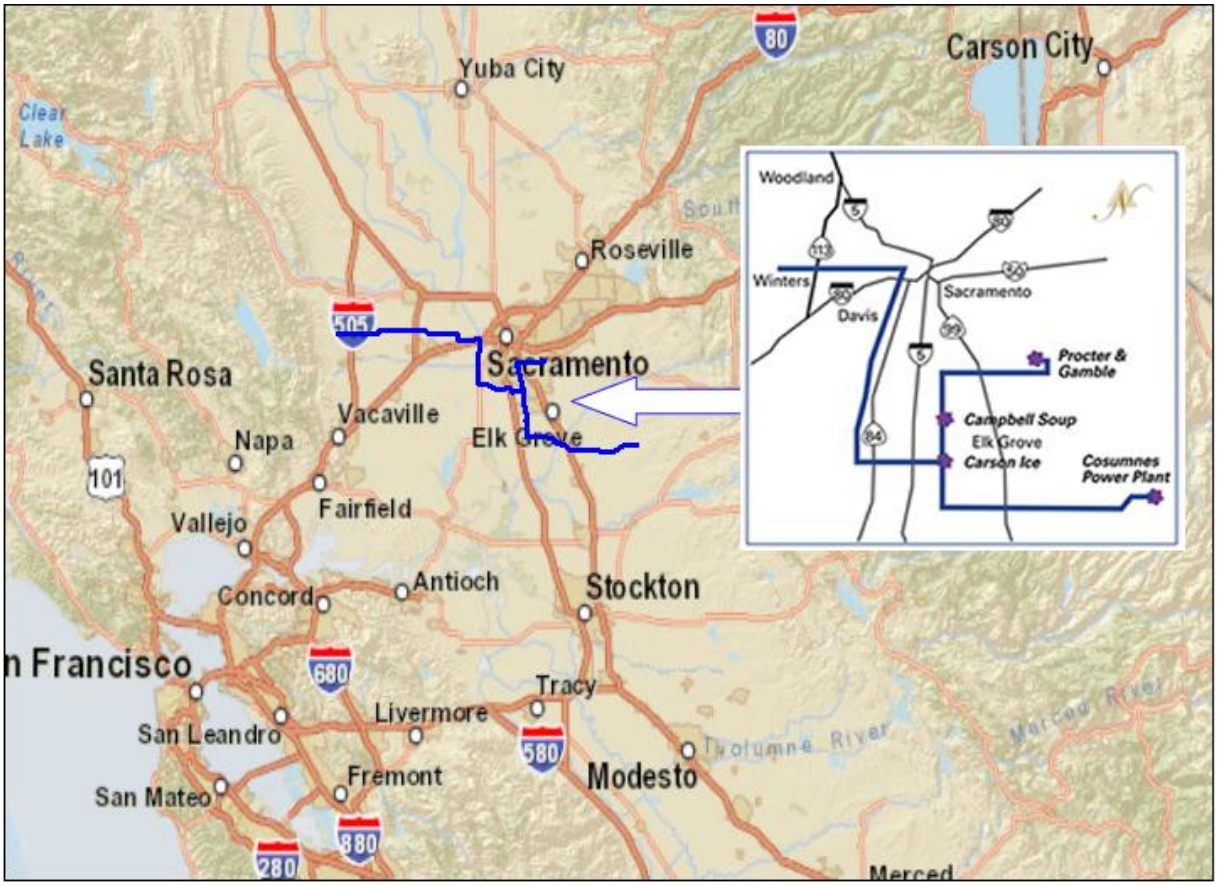
SMUD owns a transmission gas pipeline, has an equity interest in two PG&E backbone gas transmission lines, and contracts with existing interstate natural gas transmission lines to deliver natural gas to its power plants.

SMUD's diversified portfolio of gas transmission arrangements allow for the purchase of gas from a variety of suppliers and locations, and the opportunity to capitalize on regional price differentials where possible. SMUD's ownership interest in the SMUD/PG&E backbone and Local Pipeline enhances the reliability of SMUD's gas supply.

4.7.1 The Gas Pipeline

SMUD constructed and owns a 20 inch (in.), 50- mile natural gas pipeline in the greater Sacramento area (the "Local Pipeline") that transports gas to all the Local Gas-Fired Plants except SPA McClellan (See Figure 6). The Local Pipeline is interconnected with PG&E's major California gas transmission lines 400 and 401 at the Winters intertie. Additionally, it may be interconnected with one or more private gas gathering pipelines located in the area, and/or other FERC approved pipelines that may be built in the local area. In conjunction with the construction of the SFA Project, SMUD extended the Local Pipeline to the plant site. The 26-mile extension was completed in 2004. The extension is 24 in. in diameter and was designed to serve both the SFA Project and an additional second phase, if constructed.

Figure 6: SMUD Local Pipeline



4.7.2 PG&E Backbone Gas Transmission Lines 400and 401

In 1996, SMUD purchased an equity interest in PG&E's backbone gas transmission lines 300 and 401 (referred to as the PG&E backbone). The total capacity acquired is currently approximately 86,700 Dth/day. It consists of approximately 47,572 Dth/day of firm gas transport from the California–Oregon border at Malin, Oregon and 39,193 Dth/day from the California–Arizona border at Topock, Arizona, to SMUD's interconnection with the PG&E backbone near Winters, California. This purchase made SMUD a co-owner of the PG&E backbone gas transmission lines 300 and 401. It obligated SMUD to pay PG&E to operate the pipelines on its behalf, subject to the terms of the purchase agreement and operating protocols.

4.7.3 Gas Storage

SMUD also employs gas storage as part of its overall fuel supply strategy. Gas storage is useful in helping to balance gas supply, mitigate market price volatility, and provide a reliable supply to meet peak day delivery requirements.

4.8 TANC California-Oregon Transmission Project

The California-Oregon Transmission Project (COTP) is one part of a three-part 500 kV-line coordinated system known as the California-Oregon Intertie or (COI). The COTP is allocated one-third of the 4,800 MW capability of the COI system. can help increase awareness of business risks across an entire organization, instill confidence in strategic objectives, improve compliance with regulatory and internal mandates, and enhance operational efficiency through more consistent applications of processes and controls. The Transmission Agency of Northern California (TANC) TANC is entitled to use 1,390 MW, SMUD is a member of TANC and is entitled to 378 MW of the COTP capacity. SMUD is entitled to approximately 528 MW of TANC's transfer capability. SMUD relies on its COTP rights to purchase power and obtain renewable resources to supplement its own resources to serve its load.[4]

4.9 SMUD Capital Projects

SMUD's annual budget provides funding for capital programs necessary to meet the Boar'ds Strategic Directives over the year and to ensure continuity into the future.

SMUD's 2024 enterprise portfolio includes investments across our five strategic pillars – safety and reliability, environmental leadership, community vitality, affordability, and organizational agility. The proposed capital investment budget for 2024 is $555 million for planned investment in generation, transmission, distribution, buildings, vehicles, technology, and other assets critical to meeting the energy needs of our customers and community. Proposed capital expenditures go through a rigorous evaluation and prioritization process, based on strategic alignment, risk, criticality, and financials to ensure SMUD prioritizes work that has the highest contribution to the Board's Strategic Directions and our 2030 Zero Carbon vision.

5.0 SMUD Facilities

5.1 General Facilities

The SMUD Downtown Headquarters Campus is in Sacramento's East Sacramento Neighborhood, bordered by 59th Street to the west, 65th Street to the east, Folsom Blvd. to the north and S Street to the south; Sacramento Regional Transit District's Light Rail Line bisects the site. The Headquarters Campus serves as a base for daily business operations. The total site area is approximately 35 acres. The Headquarters Campus includes the original historic Headquarters building, parking areas, currently undeveloped Kramer property, 59th Street Corporate Yard, Energy Management Center, Customer Services Center, Field Reporting Facility (including Folsom Blvd. frontage property) and ancillary structures.

SMUD also operates out of additional general facilities located in and around Sacramento County: These additional facilities include the East Campus Operating Center, Sacramento Power Academy, Rancho Seco Switchyard, Hedge Training Facility and Fresh Pond Facility.

[4] Electric Revenue Bonds, 2023 Series K Official Statement, Page A-38-39, June 6, 2023.

6.0 Physical Setting

SMUD's service territory is within Sacramento County, any impacts as a result of a hazard event to SMUD's Plan Area would have the greatest impact to the Sacramento Region. As such, the assessment provided in section 6.0 will be focused on Sacramento County.

6.1 Geography

Sacramento County lies just north of the center of California's Central Valley. The confluence of two of the state's major rivers, the Sacramento and the American, lies within the County. The southwestern portion of the County extends far into the Sacramento-San Joaquin Delta, to the point just north of Antioch, where nearly all waters of the Central Valley converge. To the south, San Joaquin County is primarily agricultural. The wooded foothills of the Sierra Nevada rise to the east in Amador and El Dorado Counties.[5]

In general, Sacramento County's topography can be characterized by a broad band of very flat valley floor land in the western sector, a transition zone of gently sloping alluvial plains in the central sector, and a low foothill region in the eastern sector. Elevations range from below sea level in the delta island area in the Southwest corner of the County to approximately 800 feet in the foothill region.[6]

6.2 Climate

Sacramento County is characterized by a mild climate, with year-round sunshine. The summers are warm, with dry days and mild nights. "Rainy season" historically occurs from November through February. Mountains surround the Sacramento Valley to the west, north and east.

Torrential rain and heavy snow frequently fall on the western Sierra Nevada slopes, the southern Cascades, and to a lesser extent, the Coast Range. As a result, flood conditions occasionally occur along the Sacramento River and its tributaries.[7]

[5] Sacramento County Hazard Mitigation Plan, October 10, 2023.
[6] Sacramento County Hazard Mitigation Plan, October 10, 2023.
[7] Sacramento County Hazard Mitigation Plan, October 10, 2023.

7.0 Demographics

SMUD's service territory is within Sacramento County, any impacts as a result of a hazard event to SMUD's Plan Area would have the greatest impact to the Sacramento Region. As such, the assessment provided in section 7.0 will be focused on Sacramento County.

7.1 Population Estimates

7.1.1 Current and Historical Population

The California Department of Finance 2020 estimates for population of the County by cities are shown in table 13.

Table 13: Sacramento County Population Data by City[8]

City	Population
Citrus Heights	86,367
Elk Grove	176,972
Folsom	84,592
Galt	25,239
Isleton	780
Rancho Cordova	80,359
Sacramento	518,037
Unincorporated	604,272

7.1.2 Projected Future Population

The California Department of Finance, Demographic Research Unit is responsible by statute for maintaining postcensal population projections which are calculated using the demographic balancing equation. This method calculates the population in the target year by starting with the population from the previous year, adding nature increase (births minus deaths) and net migration that occurred during the time period between the two years.

Table 14: Sacramento County Projected Population by Year[9]

Year	Projected Population	Year	Projected Population
2024	1,569,050	**2025**	1,571,917
2026	1,576,388	**2027**	1,581,542
2027	1,581,542	**2028**	1,589,844
2029	1,600,576	**2030**	1,611,309
2031	1,621,862	**2032**	1,632,286
2033	1,643,976	**2034**	1,653,203
2035	1,663,039	**2036**	1,672,603
2037	1,682,027	**2038**	1,691,180
2039	1,699,955	**2040**	1,708,461

[8] Department of Finance Price Factor and Population Information, https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/PriceandPopulation2022.pdf, May 2022.

[9] Department of Finance Price Factor and Population Information, https://dof.ca.gov/wp-content/uploads/sites/352/2023/07/P2A_County_Total.xlsx, 2019.

7.2 Indicators for Social Vulnerability

SMUD understands that some populations are at a greater risk from the impacts of hazard events because of physical abilities or limited resources. The vulnerable populations may vary from the general population in risk perception, living conditions, access to information and services, and capabilities to address hazard impacts.

7.2.1 Customer Opt-In Program

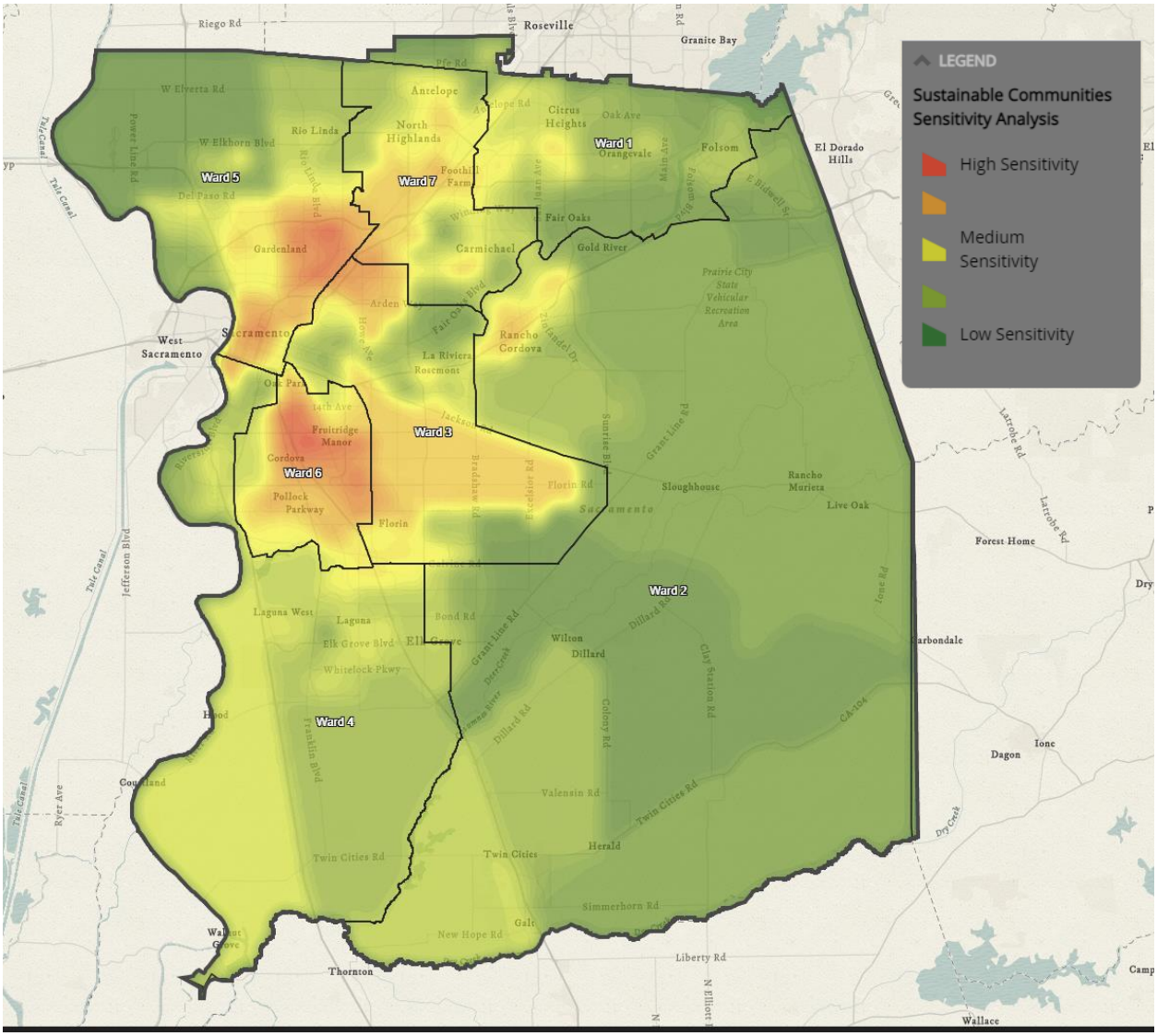
SMUD has implemented an opt-in program on smud.org that allows for vulnerable populations to enroll and receive additional information or notifications in the event of a hazard occurrence in SMUD service territory. Among SMUD's vulnerable customers are those enrolled in the Medical Equipment Discount Rate program (MED rate), Energy Assistance Program rate, 3rd Party & Senior ID and those that have self-identified and are enrolled in the vulnerable customer program. These include customers who may rely on specialized medical equipment.

7.2.2 Sustainable Communities

In addition to its Opt-In Program, SMUD has a Sustainable Communities Team which oversees a community-focused program to enhance the quality of life for all SMUD customers through innovative energy solutions. The program helps bring environmental equity and economic vitality to all communities in SMUD's service area, with special attention given to historically underserved neighborhoods.

In order to deploy comprehensive resources to the communities most in need, SMUD has developed an interactive map to help analyze current data to indicate the local areas most likely to be underserved or in distress by lack of community development, income, housing, employment opportunities, transportation, medical treatment, nutrition, education and clean environment. This map will be leveraged to support the identification of vulnerable communities during hazard events. SMUD's interactive sustainability map can be found here: Sustainable Communities Resource Priorities Map (smud.org). Figure 7 shows a stationary view of SMUD's Sustainable Communities Resource Priorities Map.

Figure 7: Sustainable Communities Resource Priorities Map[10]



A number of factors were considered when developing the interactive map. The factors considered in developing the map include:

- **Opportunity Zones**
  Opportunity zones are a new tool for community development. Established in the Tax Cuts and Jobs Act of 2017, Opportunity Zones provide tax incentives for investment in designated census tracts. California Opportunity Zones will support new investments in environmental justice, sustainability, climate change and affordable housing.

[10] https://usage.smud.org/SustainableCommunities/ , October 10, 2023.

- **Sacramento Promise Zone**
  Sacramento's designation in 2015 as a "promise zone" by the United States Department of Housing and Urban Development is the catalyst for service expansion in Sacramento's most economically distressed neighborhoods. Through the Promise Zone Initiative, the federal government works with local leaders and organizations to improve the quality of life for residents in underserved neighborhoods.

  As one of 16 urban promise zones in the nation, Sacramento's promise zone encompasses 22 square miles from Del Paso Heights in the north to The Avenues in the south. Among the 127,000 residents within the promise zone, 34% are living in poverty, 19% are unemployed and 63% of third graders are reading below grade level.

- **SB 535 Disadvantaged Communities**
  Areas designated as Disadvantaged Communities by state Senate Bill 535 are specifically targeted for investment of proceeds from the State's cap-and-trade program. These investments are aimed at improving public health, quality of life and economic opportunity in California's most burdened communities, while at the same time reducing pollution that causes climate change.

- **Sacramento Poverty, by Zip Code**
  The US Census Bureau determines the Federal Poverty Level each year. The poverty level is based on the size of the household and the ages of family members. If a person or family's total income before taxes is less than the poverty level, the person or family are considered in poverty. The areas shown within this data set represent those zip codes within Sacramento County where 25% of the population are considered to be below the poverty line.

- **Medically Underserved Areas**
  Medically underserved areas or populations are areas designated by the Health Resources and Services Administration (HRSA) as having too few primary care providers, high infant mortality, high poverty or a high elderly population. Health Professional Shortage Areas (HPSAs) are designated by HRSA as having shortages of primary medical care, dental or mental health providers and may be geographic (a county or service area), a population (e.g., low income or Medicaid eligible) or facilities (e.g., federally qualified health center or other state or federal prisons).

- **Healthy Sacramento Coalition – Health Equity**
  The Healthy Coalition's goal is to reduce tobacco use, obesity, death, and disability due to chronic disease, as well as reduce health disparities, build a safe and healthy physical environment, and improve the social and emotional well-being of Sacramento County residents. The coalition conducted an assessment identifying 15 zip codes that had consistently high rates of poor health outcomes.

- **Social Vulnerability to Climate Change Impacts in California**
  The social vulnerability index shows social vulnerability to climate change related impacts, such as natural disasters or increased heat stress. Vulnerability is defined as the susceptibility of a population to harm from exposure to a hazard and its ability to prepare for, respond to, and recover from hazards.

- **Environmental Justices: CalEnviroScreen 3.0**
  CalEnviroScreen identifies California communities by census tract that are disproportionately burdened by, and vulnerable to, multiple sources of pollution.

7.3 Economy

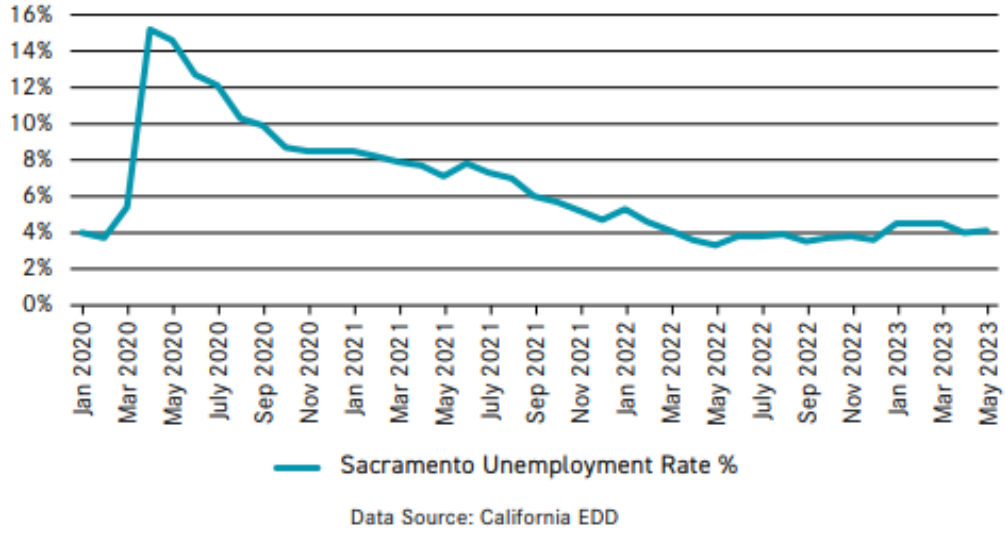
7.3.1 Industry, Businesses, and Institutions

SMUD provides electrical power to the Sacramento Region powering the state capital, technology industries, critical infrastructure, support services, businesses, agriculture, and other critical services essential to this region. An impact to SMUD's critical infrastructure could potentially have catastrophic impacts to the operations and viability of the entire region. These potential events are discussed in the hazards sections below.

7.3.2 Employment Trends and Occupations

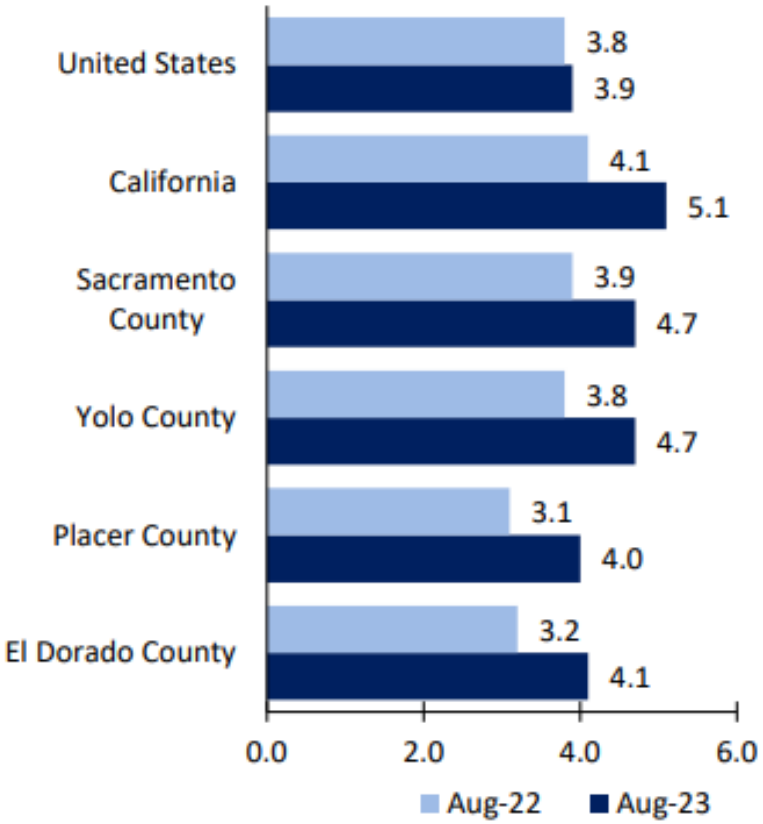
As of May 2023, the unemployment rate in the Sacramento region remained below 5 percent.[11] This is lower compared to California, but higher as compared to US unemployment rates seen in figure 8. The health care service and the education sector experienced significant job gains with nearly 13,000 jobs in the last 12 months and the construction sector performed the worst seeing a decline of more than 3,000 jobs during the same timeframe.[12]

Figure 8: Sacramento Local Unemployment Rate Since the Pandemic



[11] Sacramento Business Review, Volume 15 Issue 2, pg. 10, SBR_MidYear23_Web.pdf (squarespace.com), October 25, 2023.
[12] Sacramento Business Review, Volume 15 Issue 2, SBR_MidYear23_Web.pdf (squarespace.com), October 25, 2023.

Figure 9: Unemployment Rates for the Nation and Selected Areas[13]



8.0 Hazards

A number of different data points were used in identifying the hazards that are most likely to impact SMUD's Plan Area. These data points included past disasters within California, types of disasters, what identified disasters are in California's Hazard Mitigation Plan, as well as past disaster declarations impacting the Plan Area. Additional details on these data points will be discussed below.

8.1 Disaster Declaration

A study conducted by Moneygeek cited California as one of the most disaster-prone states with 282 disasters from 2003 to July 2023.[14] The breakdown of the disaster count for California can be viewed in table 15. The breakdown of the declared disaster category for SMUD's Plan Area is outlined in figure 10.

[13] U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics, Overviews: Geographic Information: U.S. Bureau of Labor Statistics (bls.gov), October 25, 2023.
[14] Moneygeek, *Most Disaster-Prone States*, Which State Is the Biggest Disaster? (moneygeek.com), October 25, 2023.

Table 15: Disaster Declaration by Incident for California and U.S[15]						
Location	**Total Disaster Count**	**Wildfire Count**	**Severe Storm Count**	**Hurricane Count**	**Floods**	**Other**
California	282	246	16	1	7	12
United States	2,602	1041	702	260	208	391

Figure 10: Disaster Declaration by Incident for SMUD Plan Area[16]

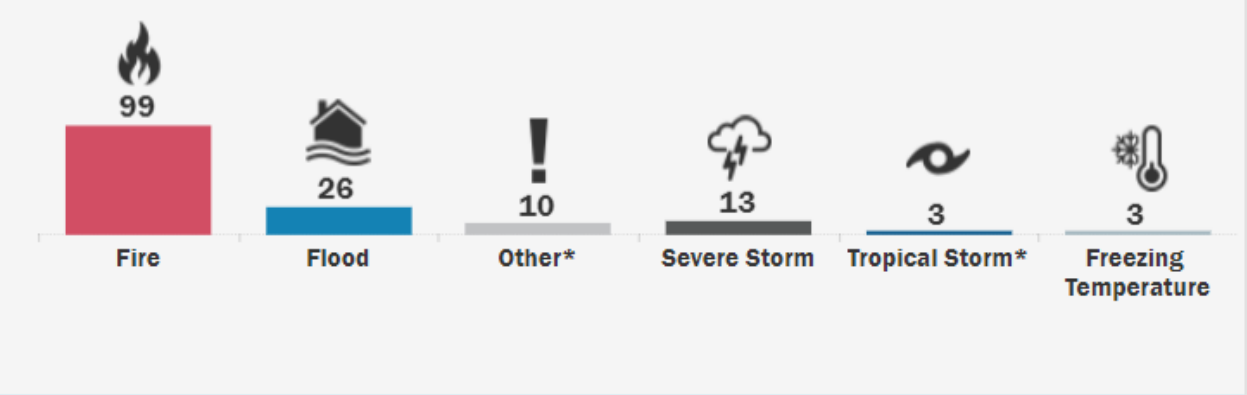


Table 16 shows the disaster declarations by county for SMUD's Plan Area.

Table 16: Federal Disaster Declarations by County[17]		
County	**Disaster Category**	**Count (#)**
Alameda	Flood	4
	Biological	2
	Severe storm	1
Colusa	Flood	3
	Biological	2
	Severe storm	2
Contra Costa	Flood	4
	Biological	2
	Severe storm	1

[15] Federal Emergency Management Agency fema.gov, October 9, 2023
[16] Federal Emergency Management Agency fema.gov, October 9, 2023
[17] Federal Emergency Management Agency fema.gov, October 9, 2023

Table 16: Federal Disaster Declarations by County[17]		
County	**Disaster Category**	**Count (#)**
El Dorado	Flood	5
	Biological	2
	Severe storm	3
	Fire	5
Fresno	Flood	3
	Biological	2
	Severe storm	1
	Fire	3
Glenn	Flood	4
	Biological	2
	Severe storm	2
Kern	Flood	2
	Biological	2
	Severe storm	1
	Fire	4
	Earthquake	1
Kings	Flood	3
	Biological	2
	Severe storm	1
Merced	Flood	3
	Biological	2
	Severe storm	2
Modoc	Flood	2
	Biological	2
	Severe storm	2
	Fire	1
Placer	Flood	3
	Biological	2
	Severe storm	1
	Fire	5
Sacramento	Flood	5
	Biological	2
	Severe storm	2
San Benito	Flood	4
	Biological	2
	Severe storm	2
San Bernardino	Flood	2
	Biological	2
	Severe storm	1
	Fire	8
	Earthquake	1

Table 16: Federal Disaster Declarations by County[17]		
County	**Disaster Category**	**Count (#)**
San Joaquin	Flood	3
	Biological	2
	Severe storm	1
Santa Clara	Flood	4
	Biological	2
	Severe storm	2
	Fire	2
Shasta	Flood	1
	Biological	2
	Severe storm	3
	Fire	10
Siskiyou	Flood	2
	Biological	2
	Severe storm	1
	Fire	7
Solano	Flood	3
	Biological	2
	Severe storm	2
	Fire	5
	Earthquake	1
Stanislaus	Flood	4
	Biological	2
	Severe storm	1
	Fire	2
Sutter	Flood	3
	Biological	2
	Severe storm	1
	Dam/levee break	1
Tehama	Flood	3
	Biological	2
	Severe storm	1
	Fire	1
Yolo	Flood	4
	Biological	2
	Severe storm	2
	Fire	3

Table 17: SMUD Hazards Comparison with California State Hazards in HMP		
2023 California State HMP	**2024-28 SMUD HMP**	**Comment**
Air pollution	Air pollution	This is a concern for SMUD and is addressed in other planning mechanisms, will include in 2024-29 update.
Civil disorder	Other hazards of interest	Civil disorder is included in a combined discussion of human-caused hazards.
Cyber threats	Cyber threats	Cyber security threats are included.
Dam failure	Dam and levee failure	These hazards are combined in one chapter.
Drought	Drought	This local hazard aligns with the State.
Earthquake	Earthquake	This local hazard aligns with the State.
Electromagnetic pulse attack	Not included	This is not a concern for the SMUD.
Energy shortage	Energy shortage	This is a concern for SMUD and is addressed in other planning mechanisms.
Epidemic/pandemic/vector-borne disease	Pandemic	Infectious disease is included.
Extreme cold or freeze	Severe weather	
Extreme heat	Extreme heat	This hazard was included in a combined discussion of severe weather hazards.
Geomagnetic storm (space weather)	Not included	This is not a concern for the SMUD.
Hazardous materials release	Hazardous materials release	Hazardous materials incidents are included.
Invasive and nuisance species	Not included	Included in SMUD's environmental plans.
Landslide, debris flow, and other mass movements	Geological hazards	
Levee failure	Levee failure	Included in SMUD's HMP.
Natural gas pipeline hazards	Natural gas pipeline hazards	Pipeline interruptions are included.
Oil spills	Oil spills	Oil spills are included.
Other potential causes of long-term electrical outage	Energy Shortage	Included in discussion in energy shortage.
Public safety power shutoff	Severe weather/wildfire	PSPS events are discussed in connection with severe weather hazard as well as wildfire.
Radiological accidents	Other hazards of interest	Radiological materials are mentioned in connection with hazardous materials incidents.
Riverine, stream and alluvial flood	Riverine, stream and alluvial flood	The flood chapter addresses these hazards.
Sea-level rise, coastal flooding, and erosion	Sea-level rise, coastal flooding, and erosion	The flood chapter addresses these hazards.

Severe wind, weather, and storms	Severe weather and storms	The severe weather chapter addresses these.
Snow avalanche	Not included	
Subsidence	Geological hazards	
Supply chain	N/A	Did not include
Terrorism	Terrorism	Terrorism is included.
Transportation accidents resulting in explosions or toxic releases	Other hazards of interest	This is a concern for SMUD and is addressed in other planning mechanisms.
Tree mortality	Tree mortality	Included.
Tsunami and seiche	Tsunami	Included.
Urban structural fire	Fire	This local hazard aligns with the State.
Volcano	Volcanoes	This is not a concern for SMUD.
Well stimulation and hydraulic fracturing	Not included	This is not occurring in SMUD's Plan Area.
Wildfire	Wildfire	This local hazard aligns with the State.

Table 18 outlines the federal disaster declarations pertaining to SMUD's Plan Area since 2017.

Table 18: Federal Disaster Declarations for California Pertaining to SMUD Plan Area[18]

Type of Event	FEMA Disaster #	Declaration Date
Severe winter storms, straight-line winds, flooding, landslides, and mudslides	DR-4699-CA	April 3, 2023
Severe winter storms, flooding, landslides, and mudslides	DR-4683-CA	January 14, 2023
Caldor Fire	DR-4619-CA	September 12, 2021
California wildfires	DR-4610-CA	August 24, 2021
California wildfires	DR-4659-CA	October 16, 2020
California wildfires	DR-4558-CA	August 22, 2020
Covid-19 pandemic	DR-4482-CA	March 22, 2020
Severe winter storms, flooding, landslides, and mudslides	DR-4434-CA	May 18, 2019
Severe winter storms, flooding, landslides, and mudslides	DR-4431-CA	May 1, 2019
California wildfires	DR-4407-CA	November 12, 2018
California wildfires and high winds	DR-4382-CA	August 4, 2018
California wildfires, flooding, mudflows, and debris flows	DR-4353-CA	January 2, 2018
California wildfires	DR-4344-CA	October 10, 2017
California severe winter storms, flooding, and mudslides	DR-4308-CA	April 1, 2017

[18]FEMA, Disaster Declarations, October 19, 2023, https://www.fema.gov/locations/california.

Table 18: Federal Disaster Declarations for California Pertaining to SMUD Plan Area[18]		
Type of Event	**FEMA Disaster #**	**Declaration Date**
California severe winter storms, flooding, and mudslides	DR-4305-CA	March 16, 2017

9.0 Regulations and Programs

The Plan must describe the review and incorporation of existing plans, studies, reports, and technical information (44 CFR § 201.6(b)(3)). In addition, it must document existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs (44 CFR § 201.6(c)(3)).

SMUD's Government Affairs team engages in all parts of the legislative, regulatory and policy development processes on behalf of SMUD. SMUD's Government Affairs team works closely with SMUD subject matter experts, local agency offices of emergency management and regional police and fire first responders to identify and mitigate a variety of hazards, including wildfire mitigation and more.

9.1 Federal and State

Table 19: Summary of Relevant Federal Agencies, Programs and Regulations		
Agency, Program or Regulation	**Hazard Mitigation Area Affected**	**Relevance**
Americans with Disabilities Act	Action Plan implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Bureau of Land Management (BLM)	Planning	Federal agency responsible for administering federal lands.
Civil Rights Act of 1964	Action Plan implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Clean Water Act	Action Plan implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Community Development Block Grant Disaster Resilience Program	Action Plan funding	This is a potential alternative source of funding for actions identified in this plan.
Community Rating System	Flood hazard	This voluntary program encourages floodplain management activities that exceed the minimum National Flood Insurance Program requirements.

Table 19: Summary of Relevant Federal Agencies, Programs and Regulations		
Agency, Program or Regulation	**Hazard Mitigation Area Affected**	**Relevance**
Disaster Mitigation Act	Hazard mitigation planning	This is the current federal legislation addressing hazard mitigation planning.
Emergency Relief for Federally Owned Roads Program	Action Plan funding	This is a possible funding source for actions identified in this plan.
Emergency Watershed Program	Action Plan funding	This is a possible funding source for actions identified in this plan.
Endangered Species Act	Action Plan implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Federal Energy Regulatory Commission Dam Safety Program	Dam failure hazard	This program cooperates with a large number of federal and state agencies to ensure and promote dam safety.
National Dam Safety Act	Dam failure hazard	This act requires a periodic engineering analysis of most dams in the country.
National Environmental Policy Act	Action Plan implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
National Flood Insurance Program	Flood hazard	This program makes federally backed flood insurance available to homeowners, renters, and business owners in exchange for communities enacting floodplain regulations.
National Incident Management System	Action Plan development	Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards.
Pipeline and Hazardous Materials Safety Administration (PHMSA)	Gas pipeline safety	PHMSA is responsible for regulating and ensuring the safe and secure movement of hazardous materials to industry and consumers by all modes of transportation, including pipelines.

Table 19: Summary of Relevant Federal Agencies, Programs and Regulations		
Agency, Program or Regulation	**Hazard Mitigation Area Affected**	**Relevance**
Presidential Executive Order 11988 (Floodplain Management)	Flood hazard	This order requires federal agencies to avoid long and short-term adverse impacts associated with modification of floodplains.
Presidential Executive Order 11990 (Protection of Wetlands)	Action Plan implementation	FEMA hazard mitigation project grant applications require full compliance with applicable presidential executive orders.
U.S. Army Corps of Engineers Dam Safety Program	Dam failure hazard	This program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act.
U.S. Army Corps of Engineers Flood Hazard Management	Flood hazard, Action Plan implementation, Action Plan funding	The Corps of Engineers offers multiple funding and technical assistance programs available for flood hazard mitigation actions.
U.S. Forest Service (USFS)	Wildfire hazard	Federal agency that manages public lands in the form of national forests and grasslands.

9.2 Fiscal Capabilities

As a community-owned, not-for-profit utility, SMUD's funding comes from its rate payers. SMUD looks holistically at its budget, programs, projects, and initiatives each year to ensure it continues to deliver value to its customers and communities in a way that maximizes benefits to all communities and the customers it serves. This process takes into consideration amongst other things, risk, and hazard impacts to the organization. SMUD's annual budget funds the prioritized projects identified for the following year.

In addition to rate payer funding, SMUD applies for varied available grants to address certain risks and hazards not budgeted during the annual process.

9.3 NFIP Compliance

SMUD is a special district without flood management responsibilities or authorities. SMUD participates in the National Flood Insurance Program (NFIP) for coverage on 4 of its powerhouses located in the UARP. The Slab Creek Powerhouse has experienced 2 separate cases of flooding.

9.4 Public Outreach Capability

SMUD has a number of teams dedicated to regular community engagement and outreach to our customers, the community, our neighbors as well as to government entities where we own or operate energy infrastructure. These teams include our Community Relations, Outreach, and Events team, Corporate Communications, Sustainable Communities, and

Government Affairs to name a few. An assessment of education and outreach capabilities is presented in table 20.

Table 20: Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? If yes, please briefly describe.	Yes HMP and WMP both have their own links on SMUD's website, in addition, SMUD has the capability to put notifications on their website header when emergencies occur or warning of potential weather danger.
Do you have any citizen boards or commissions that address issues related to hazard mitigation? If yes, please briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? If yes, please briefly describe.	Yes SMUD has a storm preparation and fire preparedness campaign annually. This includes communications via mailers, TV and radio, billboards, social media, SMUD's website, etc. The public can also subscribe to get notifications on certain topics of interest on our Board website.
Do you have any established warning systems for hazard events? If yes, please briefly describe.	Yes SMUD uses mass notification systems internally (Everbridge) for employees and externally (Message Broadcast) for customers. SMUD may also coordinate with County Emergency Services on potential Wireless Emergency Alerts and other notifications.

Part 2

Risk Assessment

10.0 Risk Assessment Methodology

Hazard risk assessment is the process of measuring the potential impact to life or property, as well as economic impacts, resulting from the hazard. Its intent is to identify from available data, the vulnerabilities of a community. The results provide a foundation on which to develop and prioritize mitigation actions to reduce damage from hazards by improving preparedness and response times and allocating resources to areas with the greatest vulnerability.

10.1 Risk Assessment Tools

10.1.1 Results and Methodology

SMUD maintains an ERM program which provides a framework and repeatable and consistent methodologies to identify, assess, manage, plan, and respond to risks and hazards to which SMUD is most vulnerable. The ERM program methodology takes into consideration impacts to six different areas (financial, legal, regulatory and compliance, workforce, reputation, operations, and strategy), as well as the likelihood and velocity of the risk occurrence. Implementing this framework and methodology, SMUD has identified the hazards listed in Table 24 that will be addressed in this HMP.

10.1.2 Mapping

Maps were produced using geographic information system (GIS) software to show the spatial extent and location of hazards when such datasets were available. SMUD has its own internal GIS function that leverages national, state, county, and city databases as well as its own to locate available spatially based data relevant to this planning effort. The maps are included in the hazard profile chapters.

10.1.3 Modeling

SMUD leveraged FEMA's GIS-based software program Hazards U.S. (Hazus) as well as past events in SMUD's Plan Area to estimate the risk impacts in the Plan Area. Hazus is used to support risk assessments, mitigation planning, and emergency planning, and response. It provides a wide range of data to estimate potential losses from natural disasters.

10.2 Risk Assessment Approach

10.2.1Enterprise Risk Management Framework

SMUD uses its existing ERM framework to identify and assess the various hazards and a summary of these assessments is included in table 21 below. SMUD's ERM framework takes into consideration both quantitative and qualitative factors to determine the level of inherent and residual risk of a particular hazard. An inherent risk level refers to the risk before any mitigations or controls are in place while the residual risk level refers to the risk after all mitigations and effective controls are considered.

All identified risks in the ERM portfolio are owned by an Executive and managed at the Director level. During a risk evaluation, the Director, manager, stakeholders, and subject matter experts are consulted. ERM staff gathers pertinent information to conduct the

evaluation which includes a root cause analysis. Information gathered includes key risk drivers, key risk impacts, mitigations, processes, procedures, controls, and internal/external risk trend.

SMUD's ERM process is integrated with internal audit processes. This integrated approach works to evaluate the effectiveness of mitigation strategies and controls implemented by management to reduce risks. ERM reviews the audit results to determine if the controls are effective strategies or are found to be ineffective. ERM staff will reassess any residual enterprise risk and work with the business areas to identify what else, if anything, needs to be done to further manage the risk to be within management's objectives.

SMUD has reviewed the hazards and determined the likelihood of occurrence, extent, severity, and significance that the hazards would have on SMUD infrastructure and business operations if they occurred.

Table 21: Hazards Assessment					
Identified Hazards	**Geographic Extent**	**Probability of Future Occurrences**	**Magnitude/ Severity**	**Significance**	**Climate Change Influence**
Air pollution	Extensive	Highly likely	Negligible	Low	Medium
Avalanches	Limited	Possible	Limited	Low	None
Bird strike	Limited	Highly likely	Negligible	Low	Low
Cyber threats	Significant	Highly likely	Catastrophic	High	None
Dam failure and safety	Limited	Unlikely	Limited	High	Low
Droughts and water shortages	Extensive	Likely	Limited	Medium	High
Earthquake hazards	Significant	Likely	Critical	High	None
Energy shortage	Significant	Highly likely	Critical	Medium	Medium
Extreme heat	Extensive	Highly likely	Limited	Medium	High
Fog	Extensive	Highly likely	Limited	Medium	Medium
Freeze	Extensive	Possible	Critical	Low	High
Hazardous materials release	Limited	Likely	Limited	Low	Low
High winds (Winds and Tornadoes)	Significant	Highly likely	Critical	High	High
Landslides and other earth movements	Limited	Likely	Critical	Medium	None
Levee failure and safety	Significant	Possible	Limited	Medium	Low
Natural gas pipeline hazards	Limited	Possible	Catastrophic	High	Low
Nuclear hazards	Limited	Unlikely	Critical	High	None
Oil spills	Limited	Likely	Limited	Low	Low
Pandemic	Limited	Possible	Limited	Medium	Low
Physical security	Extensive	Highly likely	Catastrophic	High	None
Riverine, stream and alluvial flood hazards	Significant	Highly likely	Limited	Medium	High
Sea level rise, coastal flooding, and erosion hazards	Limited	Possible	Negligible	Low	High
Severe weather and storms	Extensive	Highly likely	Critical	High	High
Subsidence	Limited	Possible	Limited	Medium	Low
Supply Chain	Extensive	Likely	Limited	Medium	Medium
Terrorism	Extensive	Likely	Catastrophic	High	Medium

Table 21: Hazards Assessment					
Identified Hazards	**Geographic Extent**	**Probability of Future Occurrences**	**Magnitude/ Severity**	**Significance**	**Climate Change Influence**
Thunderstorm	Significant	Highly likely	Critical	High	High
Tree mortality	Limited	Highly likely	Negligible	Medium	Medium
Tsunami and seiche hazards	Limited	Remote	Negligible	Low	High
Wildland-urban interfaced structural fire hazards	Limited	Highly likely	Critical	Medium	Medium
Volcanoes	Limited	Remote	Negligible	Low	None
Wildland fire hazards	Limited	Highly likely	Critical	High	High

Scoring Rubric:

Geographic Extent

Limited: Less than 10% of plan area

Significant: 10-50% of plan area

Extensive: 50-100% of plan area

Probability of Future Occurrences

Remote: 0-5% probability of occurrence.

Unlikely: no documented history of occurrence or events. 6-20% probability of occurrence. Annual probability is less than 1 in 1,000 years.

Possible: 21-50% probability of occurrence. Annual probability of between 1 in 100 years and 1 in 1,000 years.

Likely: 51-80% probability of occurrence. Annual probability of between 1 in 10 years and 1 in 100 years.

Highly likely: Frequent events with a well-document history of occurrence. Annual probability of greater than 1 every year. 81-100% probability of occurrence.

Magnitude/Severity

Catastrophic: More than 50% of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths.

Critical: 25-50% of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability.

Limited: 10-25% of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable does not result in permanent disability.

Negligible: Less than 10% of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid.

Significance or Climate Change Influence

Low: minimal potential impact/influence

Medium: moderate potential impact/influence

High: widespread potential impact/influence

11.0 Fire Hazards

11.1 Wildfire

11.1.1 General Background

A wildfire is an uncontrolled fire in a natural setting that is associated with combustible vegetation, and/or fuel. FEMA defines a wildfire as an unplanned fire burning in natural or wildland areas such as forests, shrub lands, grasslands, or prairies. Wildfires are most prevalent in conditions with high temperatures, low moisture content in the air, increased fuel accumulation, and high winds.

Climate change has the potential to exacerbate conditions ripe for wildfires. Jason Funk, senior climate scientist with the Union of Concerned Scientists (UCS) says "there is very well documented scientific evidence that climate change is increasing the length of the fire season, the size of the area burned each year and the number of wildfires[19]." The severity of wildland fires is generally a function of a terrain's combustible vegetation material and weather conditions. Tree stress and mortality, including damage due to insect infestations such as the bark beetle, exacerbate fire hazards.

11.1.2 Hazard Profile

Wildfires in the State of California have become increasingly common and destructive. Frequent drought conditions and unseasonably warm temperatures have increased, and could further increase, the possibility of wildfires occurring in areas where SMUD maintains generation, transmission, and distribution facilities. The number of diseased and dead trees has increased and could further increase this possibility. As a result, SMUD faces an increased risk that it may be required to pay for wildfire related property damage or personal injuries, fines, and penalties, some of which may not be covered by insurance, or may be disputed by insurers and could be material. In addition, a significant fire, or fires in SMUD's generation, transmission or service area could result in damage or destruction to SMUD's facilities, result in a temporary or permanent loss of energy load or otherwise materially increase SMUD's costs or materially adversely affect SMUD's ability to operate its Electrical System or generate revenues.

In SMUD's Plan Area, fire season generally extends from early spring through late fall, due to the dry and hot nature of these months. If a fire occurs along an urban or rural interface, there is a high potential the fire could destroy structures, damage critical infrastructure, injure people and could result in the loss of lives.

There are a multitude of factors contributing to the increased quantity and size of wildfires plaguing the state. These factors include increased fuel loading, an increase in human-caused ignition capabilities, increased winds, climate change which is influencing drought, longer, hotter stretches of weather and increased tree mortality. Steep slopes also contribute to fire hazards by intensifying the effects of wind, making fire suppression difficult.

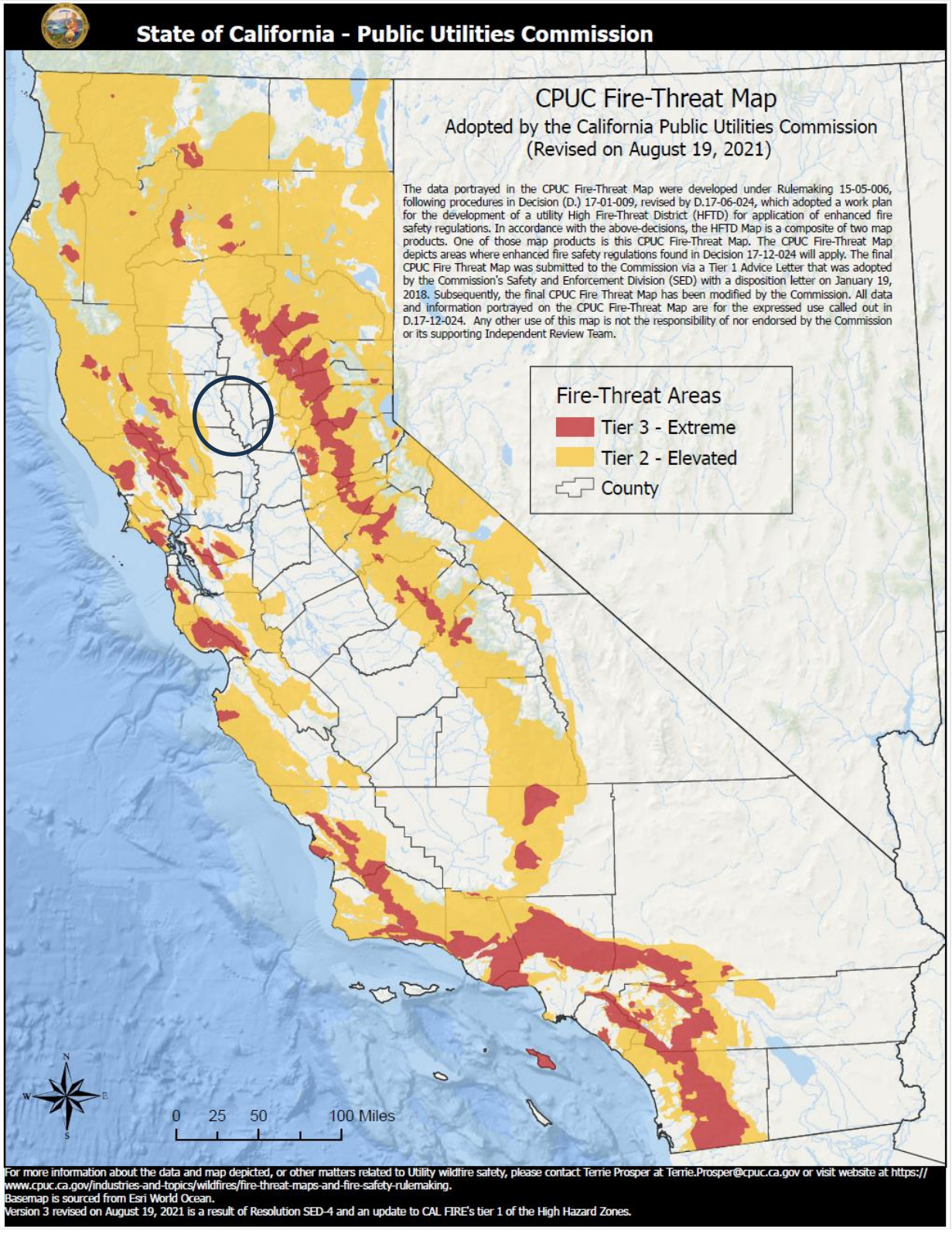
[19] Brandlin, Anne-Sophie, How Climate Change is Increasing Forest Fires Around the World. https://www.dw.com/en/how-climate-change-is-increasing-forest-fires-around-the-world/a-19465490

Location

SMUD directly participated in the development of the CPUC's Fire-Threat Map, which defines the statewide High Fire Threat District (HFTD). As a territory lead in the HFTD map development process, SMUD collaborated with utility staff, local fire, and government officials to identify areas within its service territory that may be at an elevated or extreme risk of powerline ignited wildfires. Through peer reviews and assessments by an independent team of nationwide experts led by CAL FIRE, it was determined that SMUD's service area is appropriately situated outside the HFTD. However, some of SMUD's UARP facilities are located within both Tier 2 and Tier 3 of the HFTD, outside its service area. Despite not being regulated by the CPUC, SMUD has integrated the HFTD map into its construction, inspection, maintenance, repair, and clearance practices where applicable. SMUD believes that the HFTD map accurately identifies the level of wildfire risk within its service territory and UARP.

The CPUC Fire-Threat map identifies Tier 3, extreme fire risk, Tier 2, elevated fire risk and areas outside of the HFTD. Figure 11 depicts the CPUC Fire-Threat Map and SMUD's service area location within the map.

Figure 11: SMUD's Service Area within CPUC Fire-Threat Map[20]

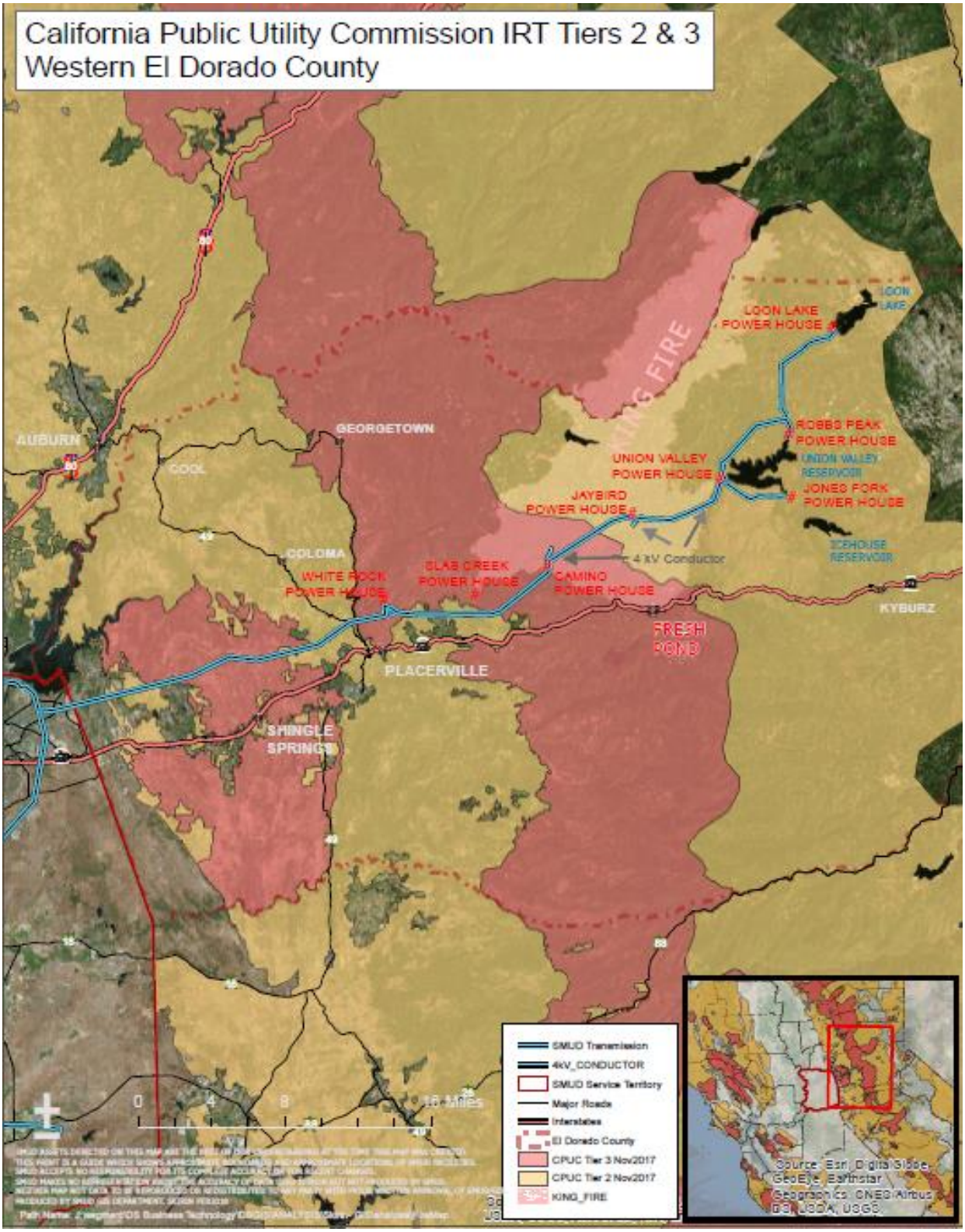


[20] Source: *State of California Public Utilities Commission*

SMUD's Plan Area within the HFTD has a higher susceptibility to wildfires specifically due to the Mediterranean climate which facilitates regular drought conditions as well as the natural plant communities that produce excess fuel, and the natural and anthropogenic ignition sources. SMUD's greatest fire threat risk is in the Western Sierra Nevada Mountain range, where the hydroelectric project known as the "UARP" is located. Within the UARP, vegetation adjacent to electrical infrastructure (powerhouses, transmission lines, switchyards, etc.) is a source of fuel. Extended periods of warm temperatures as well as greater numbers of diseased and dead trees may increase the possibility of wildfires occurring in SMUD's generation and service territories.

SMUD imports a large portion of the energy needed to serve its customers from out of its service area through the Western Area Power Authority transmission lines. These lines traverse many areas susceptible to wildfires. Actual destruction of such lines does happen, but this is not the most common threat. When a fire threatens long distance transmission lines, grid operators will derate the line. This means that less than the scheduled amount of power will be allowed to be carried by the line. This is done to reduce the amount of power which would be suddenly lost if the line were to be damaged. During heavy load periods, SMUD may not be able to obtain enough power from other sources to make up for the power lost from the derated line. Figure 12 below shows the area of the CPUC Fire Threat Map specific to SMUD's UARP.

Figure 12: CPUC Tier 2 and Tier 3 areas for SMUD's UARP



In addition to the UARP, open lands where SMUD's assets lie also pose a risk related to grass fires. Grass fires can travel very fast and threaten nearby residential areas as well as critical infrastructure.

Frequency & Severity
SMUD electric systems include several energized features that inherently possess the risk of wildland fire hazard, with the potential to affect other infrastructure as well as structures in the surrounding areas. Even with little change in their frequency, the wildfires that California sees on an annual basis can still pose a threat to electricity infrastructure for SMUD. Physical infrastructure in the direct path of a fire can see extensive damage, especially smaller lines, often fitted with wooden poles. Soot collecting on equipment and ionized particulate matter in the air can cause leakage currents or arcing. Firefighting measures can foul lines, requiring extensive cleanup or repair after the fire is cleared. Transmission lines are affected by high heat, smoke, and particulate matter of the fire. therefore, lines may be shut down as a safety measure.

Much of SMUD's electricity is imported using transmission lines through wildfire-prone lands. Due to multiple climate factors, critical transmission lines will be operating near their limits in the future. Wildfire events will further strain the system and its ability to deliver reliable power to SMUD customers.

Rural communities within El Dorado County that are situated in heavily forested areas are particularly vulnerable to wildfire. Fire can also impact the general community by damaging infrastructure such as roads, telecommunication systems, and community buildings.

Past Events
SMUD has never experienced a catastrophic wildfire involving its facilities. SMUD's service area in Sacramento County has a much lower wildfire risk profile than other areas in the State that have suffered destructive wildfires in recent years. When ignition events occur, they have historically been limited in scope. This is largely due to SMUD's more urban environment, flatter accessible terrain, low grasslands and other fuel sources outside forested areas and fewer wind events.

According to CalFire's website, the five-year average between January – July time period is 3,067 fires and 28,875 acres burned. In 2022, the state endured 7,477 fires covering 331,360 acres. For the periods from January 1, 2023, to July 1, 2023, California endured 2,251 fires spanning 7,601 acres.[21] This number continues to grow.

Large fires have been a part of the landscape history of the State of California, specifically, El Dorado County for centuries. Table 22 lists the most significant fires that have occurred near the Plan Area.

[21] Source: CalFire

Table 22: Large Wildfires near SMUD Plan Area from 1916 to Present		
Fire Name	**Year**	**Acres Burned**
Unnamed	1916	2,131
Unnamed	1916	4,306
Bottle Hill	1917	1,326
Badger Hill	1924	638
Camp 7	1959	10,225
Ice House	1959	19,099
Unnamed	1960	11,212
Kelsey Mill	1961	11,815
Pilliken	1973	10,313
Chili Bar	1979	6,927
Cleveland	1992	22,518
Fred's	2004	7,560
King	2014	97,717
Delta	2018	63,311
River (Mendocino Complex)	2018	48,920
Stone	2018	39,387
Hirz*	2018	46,150
July Complex*	2020	83,261
LNU Lightning Complex*	2020	363,220
Caldor	2021	221,835
Fawn*	2021	8,578
Mosquito	2022	76,788
	*Near TANC Transmission Lines	

It is known from 1900, and earlier, that large fires occurred in this part of the Sierra Nevada Mountains, and frequent fire return intervals (2-20 years in lower montane zone areas around Camino, Placerville, and Pollock Pines). Foothill regions of such, as where the UARP is located, burn frequently with mixed severity.

The most notable recent wildfires are the Caldor and Dixie fires in 2021, the King Fire in 2014, the Fred's Fire in 2004, and the Cleveland Fire in 1992. Historically, areas above 5,000 feet were less likely to see a major fire (between Robbs Peak and Loon Lake), with one major fire, Bottle Hill, in 1917 near Gerle Creek Reservoir. Several large fires have periodically burned in the lower elevation canyon areas near White Rock Powerhouse, the most recent being the Chili Bar Fire in 1979.

Although the Caldor and King fires did not substantially damage hydroelectric infrastructure, they did do major damage to the forest and watersheds around the UARP.

According to the U.S. Forest Service in El Dorado County, it is unlikely for any treatments or post fire timber harvesting to be conducted in the steep canyons where much of the hydroelectric infrastructure is located. A recent study indicates that without post fire logging or surface fuel treatments, woody fuels accumulate at a rate that exceeds the decomposition rate.[22] As fuel accumulates, so does the fire hazard in the UARP area.

11.1.3 Secondary Impacts

The aftermath of wildfires can see increases in debris runoff as infiltration capacity of soil is reduced in the wildfire area, especially during rain events within the two years following a significant fire. Heavy rain events following a fire may also allow water to infiltrate the loose ground soil, increasing the potential for landslides. Large swings in rainfall from season to season can encourage vegetation growth in rainy periods, leaving more fire feedstock during subsequent dry seasons and priming conditions for the spread of wildfires.

Runoff from heavy rain events also affects the production of hydropower systems that are downstream from fire prone areas, as wildfire soot and residue collect in the waterways which feed the plant. This silt and particulate matter can reduce production or even damage the turbines. [23] As precipitation patterns change in the coming decades, the aftereffects of wildfires could increase concerns for the impact on SMUD infrastructure from runoff, vegetation growth, and landslides.

11.1.4 Exposure and Vulnerability

Fire also can damage the UARP infrastructure, which includes transmission lines, powerhouses, project roads, and penstocks. Recreationalists at UARP campgrounds are particularly vulnerable if access routes are destroyed or blocked during fires. Fuel reduction treatments, including thinning, brushing, removal of forest slash and mastication along the project corridors and around powerhouses can reduce such risks. Fire also creates indirect impacts on UARP operations. Land erosion associated with denuded hillslopes, for example, can increase sedimentation of reservoirs and degrade water quality.

Recreation facilities associated with the UARP can be damaged directly by the fire, requiring lengthy periods of reconstruction. The loss of the aesthetic value of surrounding forests can also depress recreation during the long process of forest regeneration, which can have a negative effect of the economy for several years.

11.1.5 Current Mitigation Efforts

As a condition of the FERC fifty-year license authorizing SMUD to operate the UARP, SMUD is required to file with FERC, a Fire Prevention and Response Plan (FPRP) developed in consultation with appropriate State and local fire agencies and approved by the USFS. SMUD's FPRP filed with FERC was developed in consultation with the USFS, BLM and CalFire.

[22] Peterson, David, Richy J. Harrod, 2010 (May) Fuel Succession, Post-Fire Logging, and Future fire Behavior: Addressing the "Reburn Problem," Final report to the Joint Fire Sciences Program, Project Number: 06-3-4-16
[23] CEC. (2016). *Cal-Adapt Climate Tools*. Retrieved from CEC: http://cal-adapt.org/tools/

The FPRP provides in depth fire risk analysis of SMUD's most fire vulnerable regions as well as historical data, roles and responsibilities and prevention/preparedness activities.

SMUD regularly coordinates with local fire agencies and other first response agencies. It also participates with emergency operations activities in its system areas. SMUD has robust Vegetation Management (VM) programs with accelerated and targeted VM work (pruning & removal) cycles and is using enhanced technologies including LiDAR and Ortho Imagery (these technologies can help identify diseased trees and trees that are a risk to SMUD facilities). It also has robust asset inspection and maintenance programs that include traditional aerial patrols with helicopters, IR inspections using helicopters (which can detect heat from power equipment before an event occurs) and regular ground inspections of all facilities (including core testing of the wood poles).

SMUD maintains a Wildfire Mitigation Plan (WMP) that is reviewed and updated on an annual basis. The plan identifies the risks, SMUD's wildfire management programs/process, and additional mitigations where necessary. In addition, it also outlines SMUD's customer, community and stakeholder outreach and communications during de-energization events.

Table 23 depicts the activities SMUD utilizes to address specific wildfire risk factors.

Table 23: Activities that Address Wildfire Risk Factors[24]

Risk Factor	Activity
Fuel	Vegetation management. Fuels reduction. Use of LiDAR and Ortho Imagery.
Equipment/facility failure	Routine maintenance Focused design and construction standards to reduce ignition sources (e.g., use of non-expulsion fuses and arrestors, replacement of wood poles, undergrounding and other options). Transmission and distribution line detailed inspections and annual patrol. No reclosing during fire season Intrusive pole testing and pole replacement. De-energization of lines during certain conditions.
Contact from object(s)	Animal/bird guards. Raptor construction (increased line spacing). Increased vegetation clearances (at time of work).
Wire to wire contact	Weather station and monitoring.
Other	SMUD worker/contractor education on fire ignition sources from normal work activities. Fire watch (30 minutes after work completion in high-risk areas).
Private and public agency coordination	SMUD coordinates and collaborates with private and public entities to identify projects that are mutually beneficial and to improve forest health.

[24] SMUD, *2023-2025 Wildfire Mitigation Plan*, https://www.smud.org/-/media/Documents/In-Our-Community/Safety/Wildfire-Safety/WMP_2023-2025_rev1_FinalPublish.ashx, October 12, 2023.

SMUD continues to meet or exceed vegetation clearance requirements and other industry standards. SMUD has also identified a series of measures for its entire electric system intended to prevent wildfires from occurring, minimize the spread of any fire that does occur, and improve the resiliency of its system. These measures include the installation of Cal-Fire approved exempt material to reduce the risk of sparking; the strengthening of equipment exposed to strong wind conditions, and the increased monitoring of, and identified response[25] to, fire conditions.

SMUD uses Geographic Information Systems (GIS) mapping of wildfire hazard areas to analyze and plan infrastructure development. It also addresses and continuously reevaluates its assets for the density and quantity of developments, emergency access, landscaping, and water supply. SMUD performs regular patrols of vegetation and obstruction around SMUD facilities in areas that are specifically designated by CalFire as hazardous. SMUD has cyclical weed clearing and tree-trimming programs for all its equipment, regardless of the area's fire risk.

SMUD practices fuel management activities that are essential in establishing the desired levels of fire protection, while also minimizing the detrimental impacts of vegetation removal on the local terrain. Fuel management activities include grazing, prescribed burns, firewood collection of hazardous fuels, mechanical vegetation removal, and limited chemical vegetation control. SMUD has special approval from local agencies to remove vegetation with increased "fuel ladder" potential that exist outside SMUD's right of way. A "fuel ladder" is any vegetation that would allow fire to climb into the tree canopy. In addition, SMUD works with property owners to identify and perform tree pruning and removal on private property. SMUD works with the property owners to ensure they understand the work needed to ensure public safety and reliability. See Figure 13 below for examples of vegetation management clearing of distribution right of ways.

[25] The identified responses include operational procedures for the de-energization of lines during high fire threat conditions, and operational protocols for disabling the use of reclosing functionality on our transmission lines within the high fire threat areas and on our distribution lines during fire season in areas of high vegetation.

Figure 13: SMUD Vegetation Management

Table 24 depicts current wildfire fire mitigation plans, programs and efforts SMUD utilizes.

Table 24: Current Wildfire Hazards Mitigation[26]

Mitigation	Description
Wildfire Mitigation Plan	SMUD maintains a Wildfire Mitigation Plan (WMP) that is reviewed and updated on an annual basis. The plan identifies the risks, SMUD's wildfire management programs/process, and additional mitigations where necessary. In addition, it also outlines SMUD's customer, community and stakeholder outreach and communications during de-energization events.
Vegetation Management Program	SMUD maintains a vegetation management program. Trees are trimmed on one-, two-, or three-year reoccurring cycles within SMUD's Plan Area, and 18 months for those trees identified as fast growing. SMUD also removes trees with high fuel ladder potential (vegetation that allows fire to climb up into the tree canopy). This may include the elimination of hazardous trees outside of SMUD's right-of-way.
Supplier joint response coordination	Since much of SMUD's critical assets and replacement parts are unique or made to order and the lead-time for manufacturing and delivery of these materials could take up to a year. It is important for the continued operation of the power grid to

[26] SMUD, *2023-2025*

Table 24: Current Wildfire Hazards Mitigation[26]	
Mitigation	**Description**
	maintain the health and safety of our community, to participate in a supplier joint response coordination. The coordination allows SMUD to borrow from participating utilities and suppliers, key assets for immediate use.
Transmission and distribution line patrol	SMUD performs transmission and distribution line patrols, whereby staff physically inspects transmission and distribution corridors and lines, by either land or air, on a fixed interval.
Emergency Operation Center (EOC)	SMUD maintains an EOC to help coordinate real-time incident command, response, and recovery from all emergencies, including those resulting from fire hazards.
Regional agency response coordination	Focus on active participation in city, county, and state emergency management structures for assuring coordinated responses to emergencies.
UARP Fire Management and Protection Plan	SMUD's vegetation management plan with the U.S. Forest Service and other agencies regarding fire prevention and response. The plan includes hazard tree removal and trimming, and transmission line corridor clearing to protect critical hydro assets.
Annual Pole Clearing Program (Compliance with CA Public Resource Code Section 4292)	Requires the clearing of vegetation from the base of utility poles to a radius of 10 ft. in areas of mountainous land, forest-covered land, brush-covered land, or grass-covered land. This applies to certain parts of the SMUD service territory. Additionally, SMUD performs vegetation clearing around poles that are adjacent or across from CalFire's State Responsibility Area (SRA) boundary lines.
Accessibility	Increased fuel management and fuel reduction in open space, creeks, around critical facilities, and urban/wildland interface areas. Maintaining and improving access to fire prone areas.
Resiliency	Planting of fire resilient vegetation.
Signage	Providing and maintaining proper fire access signage.
Fire roads	Construct and maintain fire roads and fuel breaks on watershed property to facilitate fuel management and provide safe emergency access.
Strategic fuel modification network	Barriers to wildland fire, fire roads, greenbelts, riparian areas, and low hazard vegetative types are interlinked into a network for wildland fire control.
Purchasing fire retardant insulating fluid (FR3) in our distribution transformers	SMUD began purchasing and installing pad mounted and pole mounted transformers with FR3 fluid in 2004. All new distribution transformers installed since 2004 moving forward contain FR3 fluid. This includes replacements and new installations.

Table 24: Current Wildfire Hazards Mitigation[26]	
Mitigation	**Description**
Substation transformer oil testing	SMUD performs oil sampling and testing on substation class transformers on a fixed interval to monitor gasses and other contaminants. Monitoring the gasses has allowed us to prevent failures that could result in oil expulsion and spills. The intervals are shortened where certain thresholds are met.
Visual and Infrared (IR) inspections on substation equipment	SMUD performs Visual and IR inspections on substation equipment on a fixed interval. The inspections allow crews to identify potential hazards and problems. Issues found are corrected based on severity of the problem and nature of the equipment.
Automatic reclosing	All Valley 115 kV, 230 kV and UARP 69 kV, 230 kV transmission auto reclosers are disabled and will remain disabled to mitigate wildfire risks. SMUD disables automatic reclosing on certain substation and line reclosers that extend into the Pole Clearing Area (PCA) during fire season.
De-energization	De-energization of lines based on pre-determined conditions.
Purchase larger substation plots	Land for new substations is purchased large enough to allow transformers to be installed with adequate space around them to allow for fire breaks. The extra space also allows the transformers to be installed far enough away from potential structures on adjacent property to minimize the risk of urban structure fires.
System enhancement capital projects	Install non-expulsion devices in PCA Replace #6 copper conductors with heavier gauge aluminum. Upgrade existing 12kV feeders to SCADA reclosers in PCA Strengthen fire break valve via UARP Fuels Reduction.

11.2 Wildland-Urban Interfaced Structural Fires

11.2.1 General Background

Wildland-urban interfaced structural fires refer to the fire potential of development interspersed within, or adjacent to, landscapes that support wildland fire. Urban is defined as an area with greater than one housing unit per acre.

Wildland-urban interfaced structural fires have become an increasing concern especially in the aftermath of the Maui fire where a fast-moving fire roared down the west side of the island. A combination of drought, abundant vegetation and high winds could increase the experience of urban land fires.

11.2.2 Hazard Profile

Location

Wildland-urban interfaced fires have the greatest effect in locations where development has expanded into rural areas. Urban fires pose an increased threat to that of standard wildfires, as they can spread quickly between structures that are placed within close vicinity of one another. The community, critical infrastructure, and public safety are each affected by wildland-urban interfaced fire damages. SMUD owns, partially own or operates infrastructure in wildland-urban interfaced areas at potential risk of impacts resulting from wildland-urban interfaced fires.

Frequency and Severity

The severity of wildland-urban interfaced fires is influenced by a multitude of components, including the vegetative fuel in the area of the fire, the weather conditions, and the slope of the land. California and local agencies have adopted building codes that reduce the risk of fire embers igniting buildings. Building codes assist with reducing the frequency and severity of wildland-urban interfaced fires. However, climate change increases the risk of wildland-urban interfaced occurrence and the potential for higher rates and severity of fires increase as people move closer to fire-susceptible wildland areas.

Past Events

SMUD has not experienced an impact to its infrastructure as a result of a wildland-urban interfaced fire.

11.2.3 Secondary Impacts

Potential secondary effects of a wildland-urban interfaced fire include utility failure, poor air quality, and hazardous materials spill.

11.2.4 Exposure and Vulnerability

A wildland-urban interfaced fire affecting a SMUD owned and operated structure could result in much more than structural damage. Communication systems, energy delivery systems, critical medical services, transportation infrastructure, and all other crucial societal functions powered by energy have potential to be damaged by urban structural fires.

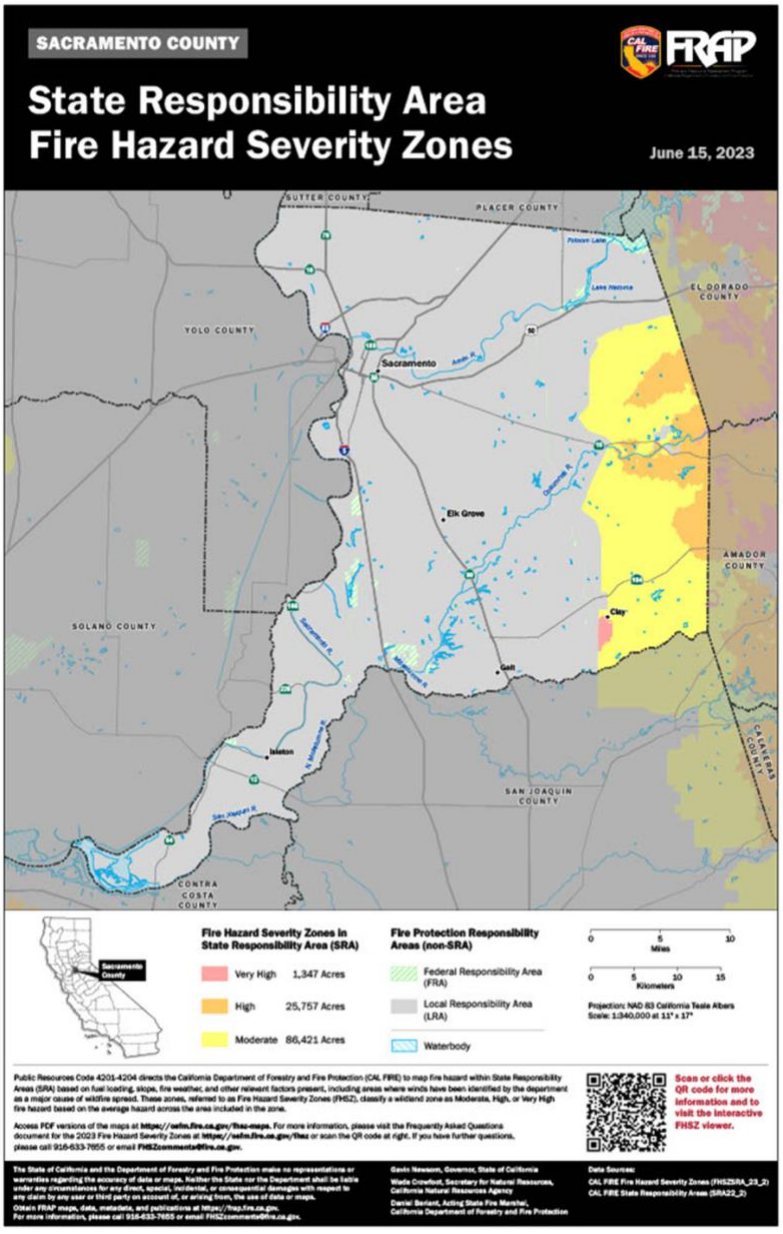
The State Fire Marshal is mandated to classify lands within State Responsibility Areas into Fire Hazard Severity Zones.

The Fire Hazard Severity Zone maps are developed using a science-based and field-tested model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior. Many factors are considered such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area. There are three levels of hazard in the State Responsibility Areas: moderate, high, and very high.

Sacramento County is not at high risk, relative to other counties in California, of urban fire hazard (See Figure 14). However, the surrounding counties of Yolo, Solano, San Joaquin, Costa, Placer, and Sutter are all "high" ranked wildfire hazard areas.[27] A wind event combined with a wildfire event in a bordering county would put SMUD at an increased risk for a wildland-urban interfaced fire hazard event.

Figure 14 depicts the map developed by the State Fire Marshal's office illustrating the Fire Hazard Severity Zones for Sacramento County.

Figure 14: Fire Hazard Levels in Sacramento County[28]



[27] Source: *2018 California State Hazard Mitigation Plan*
[28] Source: *Department of Forestry and Fire Protection*

Figure 15 depicts the map developed by the State Fire Marshal's Office illustrating the fire threat predictions for SMUD's service area as well as additional areas with SMUD facilities and infrastructure. Figure 16 depicts the map developed by the California Public Utilities Commission illustrating the fire threat predictions for SMUD's service area as well as additional areas with SMUD facilities and infrastructure.

Figure 15: CAL Fire - Fire Threat Predictions around SMUD Service Area

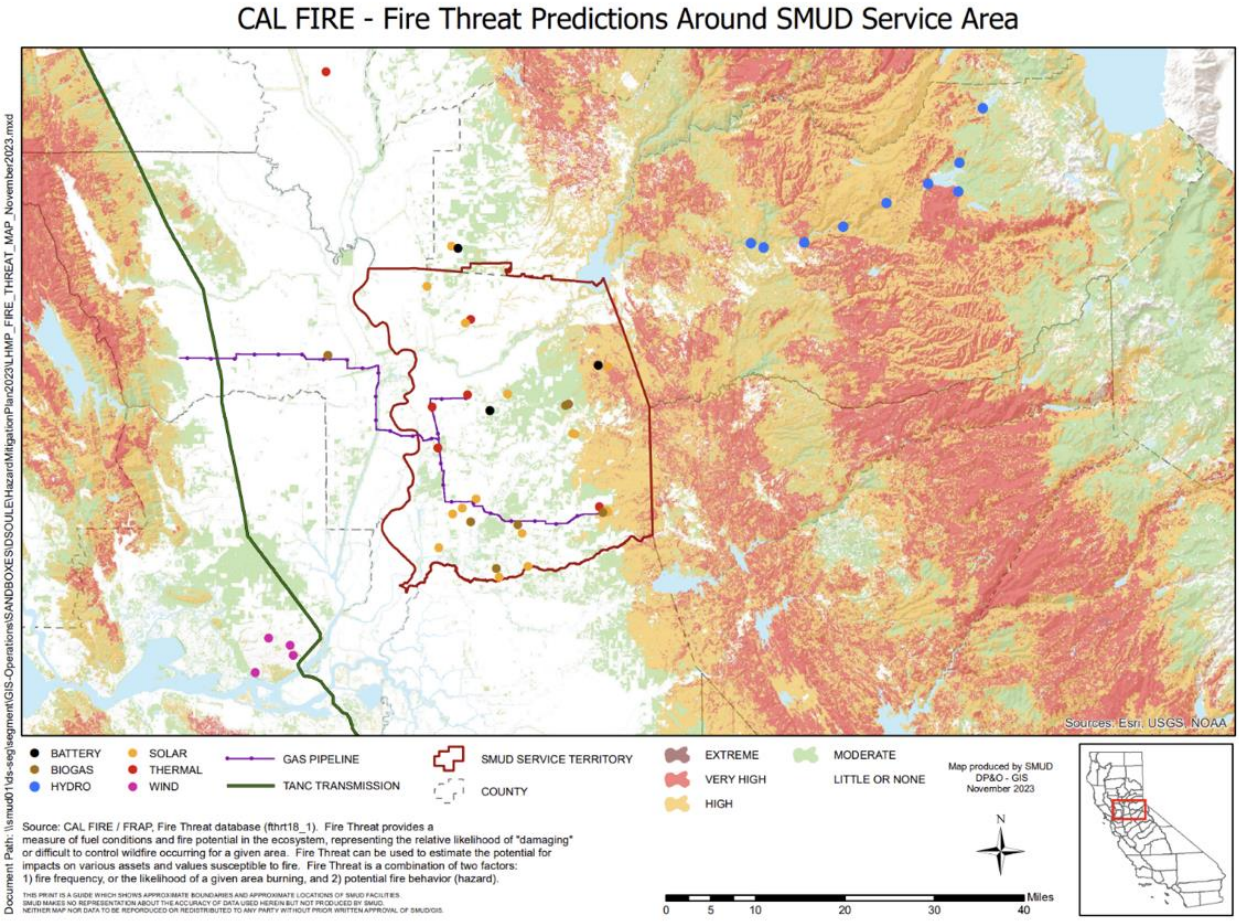
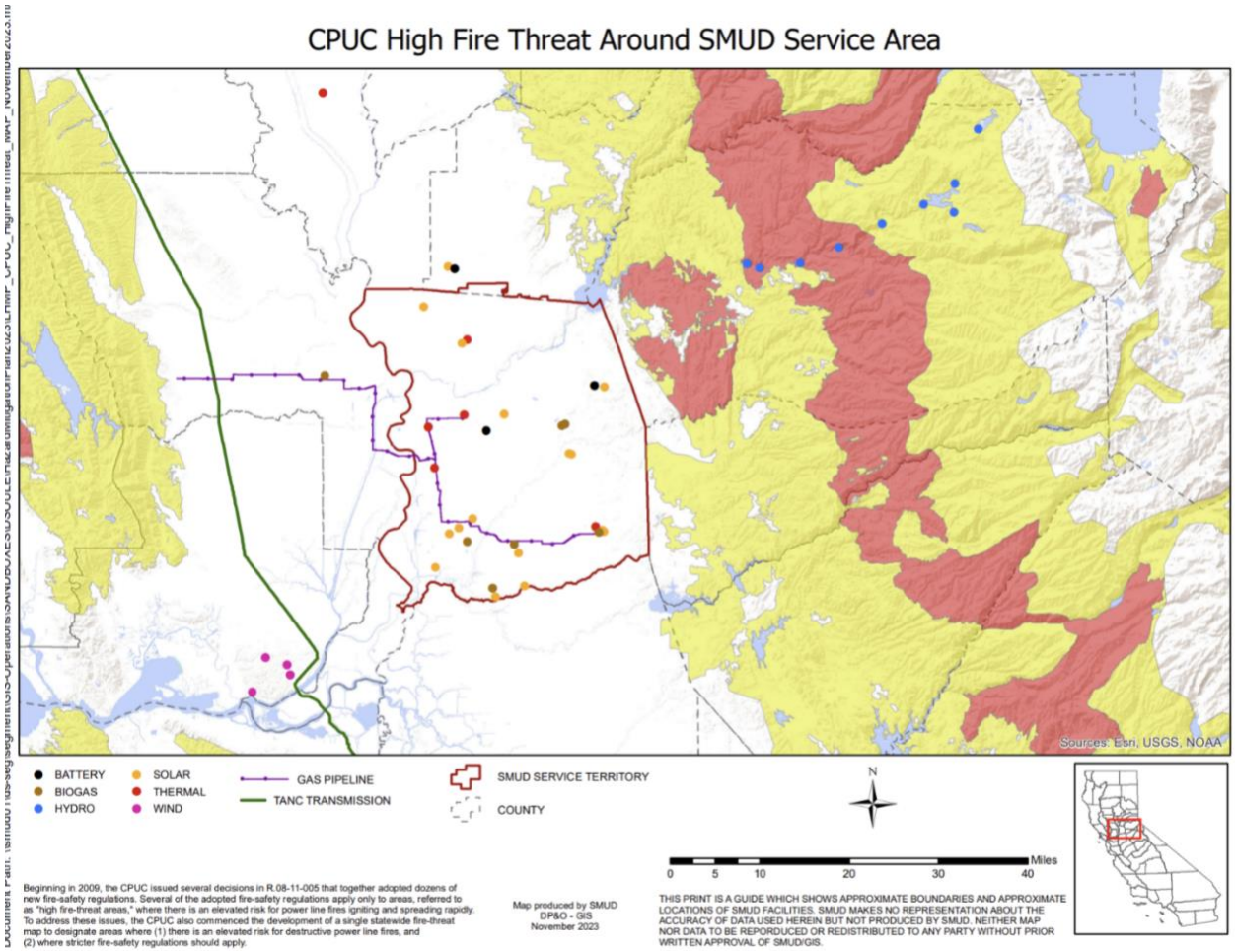


Figure 16: CPUC High Fire Threat around SMUD Service Area



11.2.5 Current Mitigation

Table 25 depicts the current wildland-urban interface structural fire mitigation efforts SMUD utilizes.

Table 25: Current *Wildland-Urban Interface* Structural Fire Hazards Mitigation

Mitigation	Description
New SMUD construction follows California's Building Code	California's Wildland-Urban Interface Code serves to establish minimum standards for the protection of life and property by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flames or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses. SMUD complies with the California Building Code and Wildland-Urban Interface Code for all of its structures located within State Responsibility Areas and Urban Wildland Areas regardless of the areas' fire risk.
Establishing defensible space	SMUD also implements the creation of defensible space, or the removal of fuel bearing vegetation within 100 feet of a structure.
Prescribed burning	At times, SMUD will support prescribed burning to reduce fuel loads that threaten public safety and property.
Management and maintenance of existing structure	Continually monitor and update facilities and infrastructure to comply with regulatory requirements and fire safety standards.
Survey areas	Spray areas already cleared to maintain vegetation around facilities. Survey areas for potential vegetation removal.

12.0 Water Rise Hazards

This section will cover flood and other water rise hazards collectively. These water rise hazards include:

- Flood and flash floods
- Riverine, stream and alluvial flood hazards
- Sea level rise, coastal flooding, and erosion hazards
- Tsunami and seiche hazards
- Levee failure
- Dam failure

12.1 Flood and Flashflood

12.1.1 General Background

Flooding occurs when a body of water rises and overflows onto "normally" dry land. Floods are the most common of all weather-related natural hazards and can happen during heavy rains, when ocean waves come on shore, when snow melts quickly, or when dams and levees break. Flooding can result in significant damage to structures, landscapes, utilities, and human life.

12.1.2 Hazard Profile

According to the National Oceanic and Atmospheric Administration (NOAA) National Severe Storms Laboratory, "damaging flooding may happen with only a few inches of water, or it may cover a house to the rooftop. Floods can occur within minutes or over a long period, and may last days, weeks, or longer. Floods are the most common and widespread of all weather-related natural disasters."

Flash floods are the most dangerous kind of floods because they combine the destructive power of a flood with incredible speed. Flash floods occur when heavy rainfall exceeds the ability of the ground to absorb it. They also occur when water fills normally dry creeks or streams or enough water accumulates for streams to overtop their banks, causing rapid rises of water in a short amount of time. They can happen within minutes of the causative rainfall, limiting the time available to warn and protect the public.

Location

Flooding occurs in every part of the United States (U.S.) and is a catastrophe around the world. In the U.S. floods kill more people each year than tornadoes, hurricanes, or lightning.

Densely populated areas are at a higher risk for flashfloods as roadways, buildings and other structures increase runoff by reducing the amount of rain absorbed by the ground.

Most of SMUD's transmission and power generation infrastructure and equipment are located in areas that are less populated. Most of SMUD's distribution infrastructure and equipment are located within more densely populated areas. However, SMUD does own transmission in Sacramento County in very urban areas. SMUD's infrastructure is susceptible to both floods and flashfloods.

In addition, Sacramento, where SMUD's Headquarters Campus and East Campus Operation Center are located, is located by many rivers, lakes, levees, and dams, which have the potential of flooding.

Frequency and Severity

According to the State of California's Multi-Hazard Mitigation Plan, flooding is widespread and the second most frequent disaster source in the State. Flooding is the most frequent and costly natural hazard in the United States, a hazard that has caused more than 10,000 deaths since 1900. Approximately 90 percent of presidentially declared disasters result from natural hazard events with flooding as a major component. The Plan Area, specifically Sacramento, has the greatest risk of flooding of any major city in the country. [29]

[29] Sacramento County Water Resources
http://www.waterresources.saccounty.net/stormready/Pages/Region's-Flooding-History.aspx

Past Events

The most notable flooding in the Sacramento area occurred in 1986, 1995, 1997, 2006, and 2023. Table 26 shows available data found for most recent flood events in the National Climatic Data Center (NCDC) database for the Plan Area.

Table 26: Selected List of Flood Events in SMUD Plan Area

County/Zone	Date	Deaths	Injuries	Property Damage $	Crop Damage $
Motherlode Camptonville	12/12/1996	0	0	0	0
Southern Sacramento Valley	12/12/1996	0	0	0	0
Northern Sacramento Valley	12/29/1996	0	0	20K	0
Southern Sacramento Valley	2/2/1998	0	0	4.3M	7.8M
Northern Sacramento Valley	2/2/1998	1	0	20.8M	6.5M
Carquinez Strait and Delta	2/2/1998	1	0	0	0
Central Sacramento Valley	2/2/1998	0	0	0	0
Yolo West, North East Solano, Sacramento	1/23/2000	0	0	0	0
Sutter	1/1/2006	0	0	900K	0
Solano	1/1/2006	1	1	15M	0
Sacramento	1/1/2006	0	0	4.5M	0
El Dorado	1/1/2006	0	0	3.2M	0
San Joaquin	4/2/2006	0	0	250K	50K
Sacramento	1/3/2017	0	0	0	0
Sacramento	12/26/2022	5	0	0	0
Sacramento	1/3/2023	17	--	123.8M	--

12.1.3 Exposure and Vulnerability

If flooding were to occur in the Plan Area, impacts could include loss of life, reduction of grid reliability, damage to infrastructure and increased safety risks. Within 6 hours of heavy rain, area rivers and tributaries become swollen and can even begin to overspill their banks in a few places, especially in historically vulnerable locations: small streams, creeks, canals, and drainage ditches tend to overflow. Normally dry gullies or dry creek-beds become alive. In flatter terrain, expanded areas of inundation occur around low-lying spots covering several secondary roads. In urban places, expanded areas of inundation occur at several underpasses or poor drainage spots, with some streets and parking lots taking on moving water. Storm drains and retention ponds overflow. In mountain areas, considerable run-off moving fast down the valley washes out some roads, especially in river valleys. Hillsides vulnerable to erosion become a concern for mudslides. Overall, flash flooding impacts buildings and roads with several evacuations necessary; damage is moderate.

Flooding, erosion, and debris flows commonly occur in California during periods following large, hot fires. Wildfires greatly reduce the amount of vegetation and affect the soils, which in turn reduces the capabilities for the terrain to absorb rainwater. This effect allows for excessive water runoff that will often carry large amounts of debris. Structures located near a major burn area are most susceptible to flooding.

SMUD's Plan Area has experienced flooding periodically during and following major storms. This is a natural incident, given that the City of Sacramento is located at the confluence of two major rivers. It was commonly believed prior to 1986 that the levees containing the Sacramento River and the American River were of sufficient height and stability to protect the City of Sacramento from 100-year or greater storms. However, the storms that occurred in February 1986 demonstrated that those levees are not sufficient. Not only was the City of Sacramento at risk from the water flowing through the Sacramento and American Rivers, but also from the tributaries and streams that flow into those rivers, particularly Natomas East Main Drainage Canal, Arcade, and Magpie Creeks in the north and Morrison Creek stream group in the south that eventually flows into Beach Lake and returns to the Cosumnes watershed. As a result, the Sacramento Area Flood Control Agency (SAFCA) was formed to work with State and Federal authorities to identify and construct levee improvements and other facilities to provide 200-year level of protection for the City of Sacramento on the American River system. This work is still ongoing.

SMUD will likely encounter direct and indirect impacts from sea level rise and flooding in the next several decades. While sea level rise and flooding are each a concern of climate change, the impacts compound in the Sacramento region due to the interconnected nature of snowmelt from the Sierras and ocean access from the Sacramento-San Joaquin Delta (the Delta). SAFCA suggests that Sacramento has the greatest risk of flooding when compared to all other cities in the United States.[30]

12.1.4 Future Trends in Development

Sea level along California's coast has risen approximately 7 in. in the last century,[31] and this rate is expected to accelerate south of Cape Mendocino 5 – 24 inches (5 in – 2 ft.) by 2050 and 17 – 66 inches (1.4 - 5.5 ft.) by 2100 relative to a 2000 baseline dependent on specific carbon emissions scenarios.[32] With current sea-level rise conditions, the Risky Business Project predicts that roughly $8-$10 billions of existing property in California could be flooded by 2050 with an additional $6-$10 billion susceptible to flooding at high tides.[33]

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[30] SAFCA. Flood History – Sacramento Flood Threat. Accessed on July 11, 2014. http://www.safca.org/floodhistory/floodthreat.html

[31] California Climate Change Center. 2012. Our Changing Climate 2012 Vulnerability & Adaptation to the Increasing Risks from Climate Change in California – Brochure. Publication # CEC-500-2012-007. Retrieved from http://climatechange.ca.gov/climate_action_team/reports/third_assessment/

[32] What Threat Does Sea-Level Rise Pose to California? Legislative Analyst's Office. (2020, August 10). Retrieved March 17, 2022, from https://lao.ca.gov/Publications/Report/4261

[33] Risky Business Project. 2015. The Economic Risks of Climate Change in the United States: From Boom to Bust? Climate Risk in the Golden State. Retrieved from: http://riskybusiness.org/report/from-boom-to-bust-climate-risk-in-the-golden-state/

Combined with Sacramento's particular vulnerability to flooding, sea level rise could have major implications to assets and infrastructure on which SMUD depends.

12.2 Riverine, Stream and Alluvial Flood Hazards

According to Sacramento County, numerous parcels and roads throughout the County not included in FEMA-100 and 500-year floodplains are subject to flooding in heavy rains. In addition to flooding, damage to these areas during heavy storms includes pavement deterioration, washouts, mudslides, debris areas, and downed trees. SMUD's Plan Area is vulnerable to flood (riverine, stream and alluvial), sea-level rise, erosion, tsunami, landslides, severe thunderstorms, and tree mortality. There are many vulnerable public and private assets, crops, vulnerable communities (elderly, children, disabled, etc.), SMUD power assets, water facilities, etc. within SMUD's Plan Area. If any of the above events were to occur, it could adversely impact first response services provided.

Riverine flooding happens when a watercourse exceeds its "bank-full" capacity. The event is generally a result of prolonged rainfall, or a combination of rainfall and snowmelt. In SMUD's Plan Area, riverine flooding will occur most often between the months of November and April. The intense storms that happen during these months can overwhelm local waterways and compromise the integrity of flood control structures.

12.3 Sea Level Rise, Coastal Flooding and Erosion Hazards

Coastal erosion is a natural geomorphic process. Coastal erosion is accelerated by factors such as winter storms, tidal action, wind-generated high surf, wave action, and rising sea levels. Periods of heavy rain have resulted in the highest sea level readings along California's coast. Climate change plays a significant role in rising sea levels and may increase the frequency of severe weather and winter storms.

Sea level rising has a significant impact on the environment. If coastal habitats are unable to migrate inland due to rising sea levels, they may become inundated by salt-water intrusion. This will result in land subsidence, a loss of habitat for fish and wildlife, and loss of aesthetic, recreational, and commercial uses.

SMUD has not been impacted by any instances of sea level rise, coastal flooding, or erosion hazards. It is anticipated that with climate change, SMUD could potentially be impacted by this in the future.

12.4 Tsunami and Seiche Hazards

A tsunami is a wave triggered by any form of land displacement along the edge or bottom of an ocean or lake. Tsunamis are rare and can quickly put the lives of coastal residents, business, and visitors in jeopardy. California is vulnerable to local and distant tsunamis, but tsunamis are typically more disastrous and threatening because they afford at-risk populations only a few minutes to reach safety.

A seiche is a standing wave in an enclosed or partially enclosed body of water. Seiches have been observed on lakes, reservoirs, bays, harbors and at sea. Seiches could cause damage to

wildlife and could result in flooding in the surrounding areas and destruction of port facilities.

SMUD has not been impacted by any instances of a tsunami or seiche. It is anticipated that with climate change, SMUD's Plan Area could potentially be impacted by this in the future. Some of SMUD's Plan Area is located near bodies of water prone to either tsunamis or seiche. Climate change is linked to an increase in the frequency and intensity of extreme weather events that influence seiche and tsunami conditions.

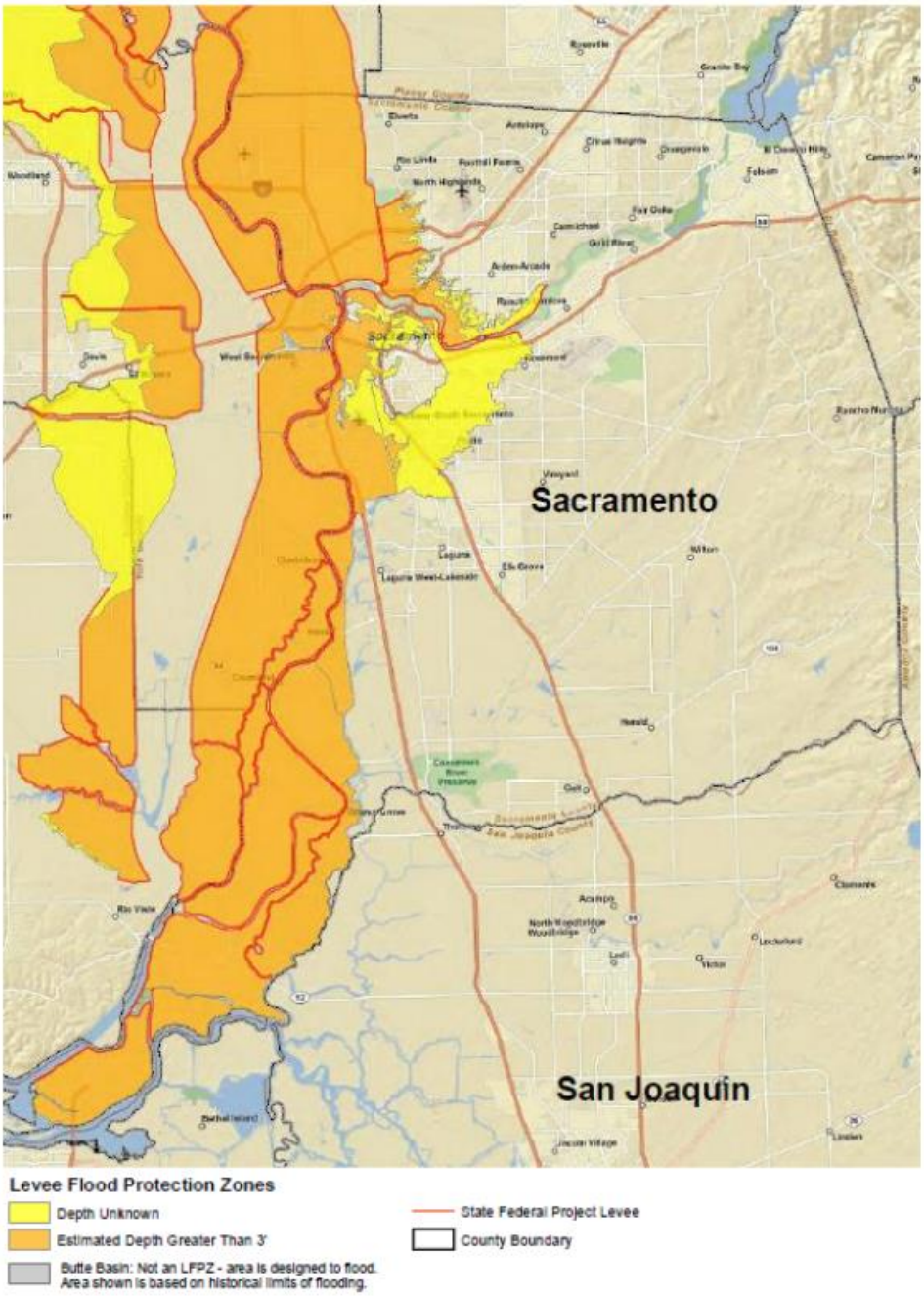
12.5 Levee Failure

A levee failure or breach is classified where a levee partially or completely releases the previously contained water to flood the land behind the levee. The two main reasons for levee breaches are erosion and overtopping. Erosion can be caused by natural elements such as the wind and water, which can create new or worsen existing damage of the levee. A majority of the urban center of Sacramento is dependent on the presence of levees (See Figure 17). A levee failure would be detrimental to SMUD's Plan Area.

Folsom Dam provides primary flood management for much of Sacramento County. The dam is operated in concert with other major dams on the Yuba, Bear, Feather, and smaller rivers to protect various areas from flooding. Levees protecting Sacramento could fail if water were released from Folsom Dam or other dams which could cause the American River or Sacramento River to rise above the top of the levees. The release capacity of Folsom Dam substantially exceeds the capacity of American River levees, and Sacramento could be flooded to protect the safety of Folsom Dam or other areas. This flood operation decision is the responsibility of the US Army Corps of Engineers.

A major flooding of downtown Sacramento would present great challenges for SMUD. Much of the California government would be without electrical power for many weeks, potentially even longer (months) due to supply chain impacts, first while floodwaters receded and then later while repairing the damage to the underground distribution system and other area assets. Many thousands of downtown employees would not be able to work and would suffer economic hardship. SMUD revenues would be impacted since key business and government customers would be unable to purchase electricity. Damage to highways such as Interstate-5, Interstate-80, State Route 99, US 50, and railroads could prevent shipment of necessary replacement parts like switchgear and transformers as well as preventing telecom companies from repairing their facilities to enable telecommuting.

Figure 17: 2021 Sacramento County Flood Protection Zones[34]



Approximately 150 years ago, the levees of the Sacramento-San Joaquin Delta were raised to prevent flooding on some of the most fertile farmland in the nation. Levee failure is a high risk to SMUD due to SMUD's Plan Area being surrounded by a network of 518 miles of levees.[34]

[34] Source: Sacramento County. 2021 Multi-jurisdictional Hazard Mitigation Plan Update – *July 2021 Public Review Draft*

Areas subject to flooding because of a levee breach in SMUD's service area are adjacent to the Sacramento, Cosumnes, Mokelumne, and American Rivers. In addition, various sloughs, creeks, and other drainage vehicles are subject to flooding. Other areas that flood periodically are low lying. The Sutter and Yolo bypasses afford an appreciable level of flood protection from Sacramento River overflows during the winter and spring months, leaving the American and Cosumnes River as the major slow-rise flood threat. Water from the Sacramento River overflows into these bypasses over the Tisdale, Fremont, and Sacramento Weirs.

The potential of a major, catastrophic levee failure on a major watercourse is like that of a levee overtopping on a secondary stream. The State/Federal River Forecast Center in Sacramento monitors the Sacramento, Cosumnes, Mokelumne, and American Rivers through a series of stations located along the rivers. The system affords a degree of advance flood warning for emergency responders.

12.6 Dam Failure

Since the 1850's, hundreds of dams and reservoirs have been built in California. They have been built to provide water for populations and agriculture, to allow for flood control, as a source of hydroelectric power, and for recreation. The storage capacity of these reservoirs ranges from a few hundred acre-feet to 5,000,000 ac-ft. The water from these reservoirs eventually makes its way to the Pacific Ocean through several river systems.

Dam failure is defined as any uncontrolled release of water, and it does not need to be a complete and catastrophic failure of a dam. Depending on the nature of the failure, it can result in a small release of water, or it can lead to catastrophic flooding. Dam failure can be the result of a variety of natural or human-induced factors such as structural failure of the materials constituting the dam and/or spillways, dam overtopping due to flood conditions, earthquakes, sabotage, and inadequate maintenance and monitoring. In the event of a dam failure, the energy of the water stored behind the dam can cause rapid and unexpected flooding downstream, affecting multiple communities and river landscapes, resulting in loss of life and property damage. Secondary effects include loss of water supply or power generation.

SMUD owns the following dams:

Table 27: SMUD Owned Dams	
Brush Creek Dam	Loon Lake Dam
Buck Island Dam	Rancho Seco Dam
Camino Dam	Robbs Peak Dam
Chili Bar Dam	Rubicon Dam
Gerle Dam	Slab Creek Dam
Ice House Dam	Union Valley Dam
Junction Dam	

There are several other dams not owned by SMUD, both within and outside SMUD's plan area, where a catastrophic dam failure would impact SMUD electrical system infrastructure and affect SMUD customers in myriad other ways.

12.6.1 Hazard Profile

SMUD's Plan Area has historically been subject to periodic flooding. Much of the flood risk in SMUD's Plan Area is a result of heavy rainfall and resulting stream and drainage canal overflows. Figure 18 below is the Flood Insurance Rate Map (FIRM) of SMUD's Plan Area, which shows special hazard areas and risk premium zones, as delineated by FEMA. There have not been any flooding related hazards because of SMUD's operations.

Flooding resulting from a dam failure can also result from any one or a combination of the following causes:

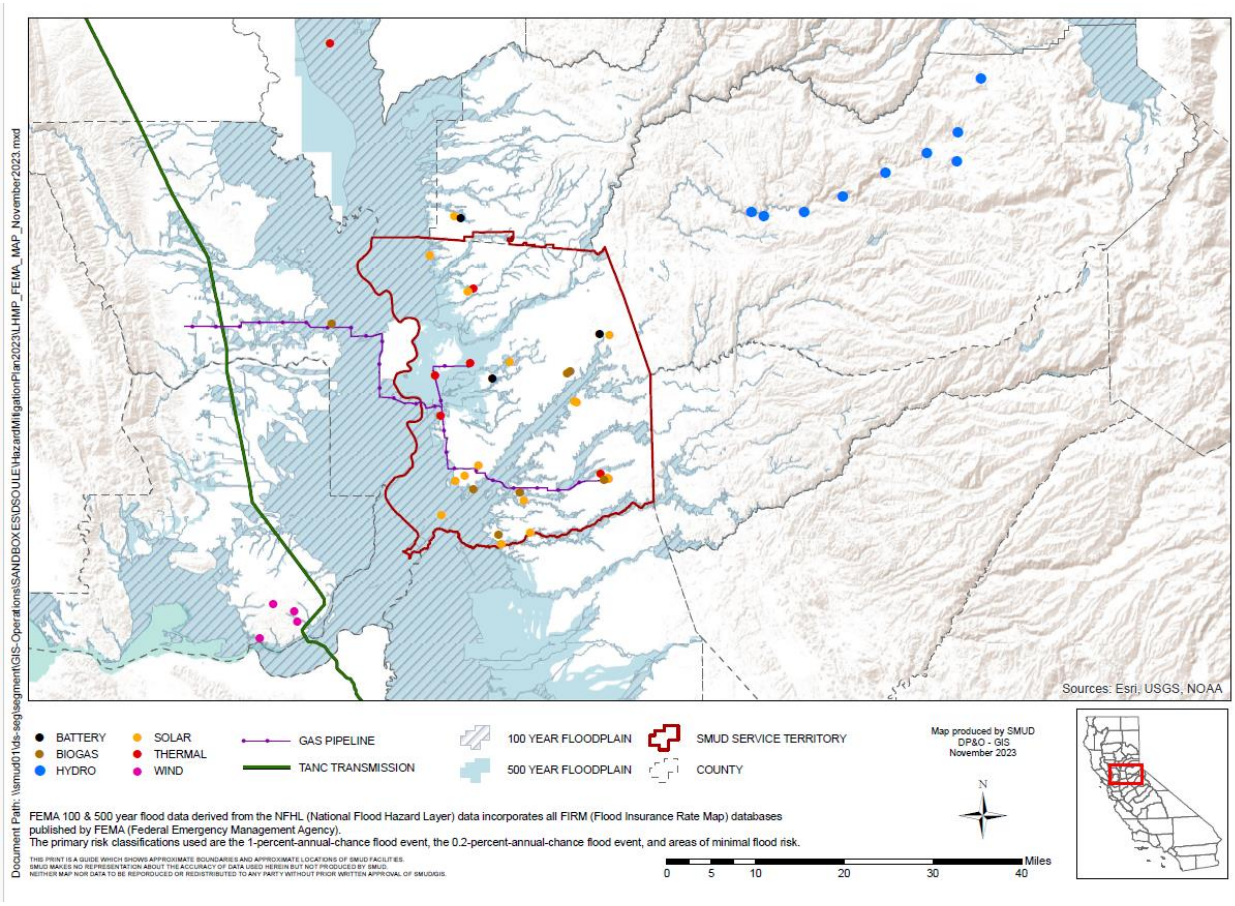
- Earthquake;
- Inadequate spillway capacity resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage, piping or rodent activity;
- Improper design;
- Negligent operation; and/or
- Failure of upstream dams on the same waterway to name a few.

The California Department of Water Resources (CA DWR) Division of Safety of Dams (DSOD) and the Federal Energy Regulatory Commission (FERC) Division of Dam Safety and Inspections (D2SI) have dam safety regulatory oversight of SMUD's dams. They also assign hazard classifications to dams. Existing land use and land use controls (zoning) downstream of the dam are two factors considered in assigning hazard ratings. CA DWR DSOD uses four hazard classification categories:

- Extremely high hazard potential – expected to cause considerable loss of huma life or would result in an inundation area with a population of 1,000 or more;
- High hazard potential – expected to cause loss of at least one human life;
- Significant hazard potential – no probable loss of human life but can cause economic loss, environmental damage, impacts to critical facilities, or other significant impacts;
- Low hazard potential – no probable loss of human life and low economic and environmental losses. Losses are expected to be principally limited to the owner's property.

SMUD owns 6 dams that are designated by CA DWR DSOD as high or extremely high hazard potential dams. They are the Loon Lake, Ice House, Union Valley, Slab Creek, Chili Bar and Rancho Seco Dams. The locations of all SMUD dams can be found in figure 18 below.

Figure 18: FEMA 100- & 500-Year Flood Plains around SMUD Service Area



In addition, dam failures have the potential to cause loss of life, damage to property, and other ensuing hazards, as well as the displacement of persons residing in or near the inundation path. Damage to electric generating facilities and transmission lines could also affect life support systems in communities outside the immediate hazard areas.

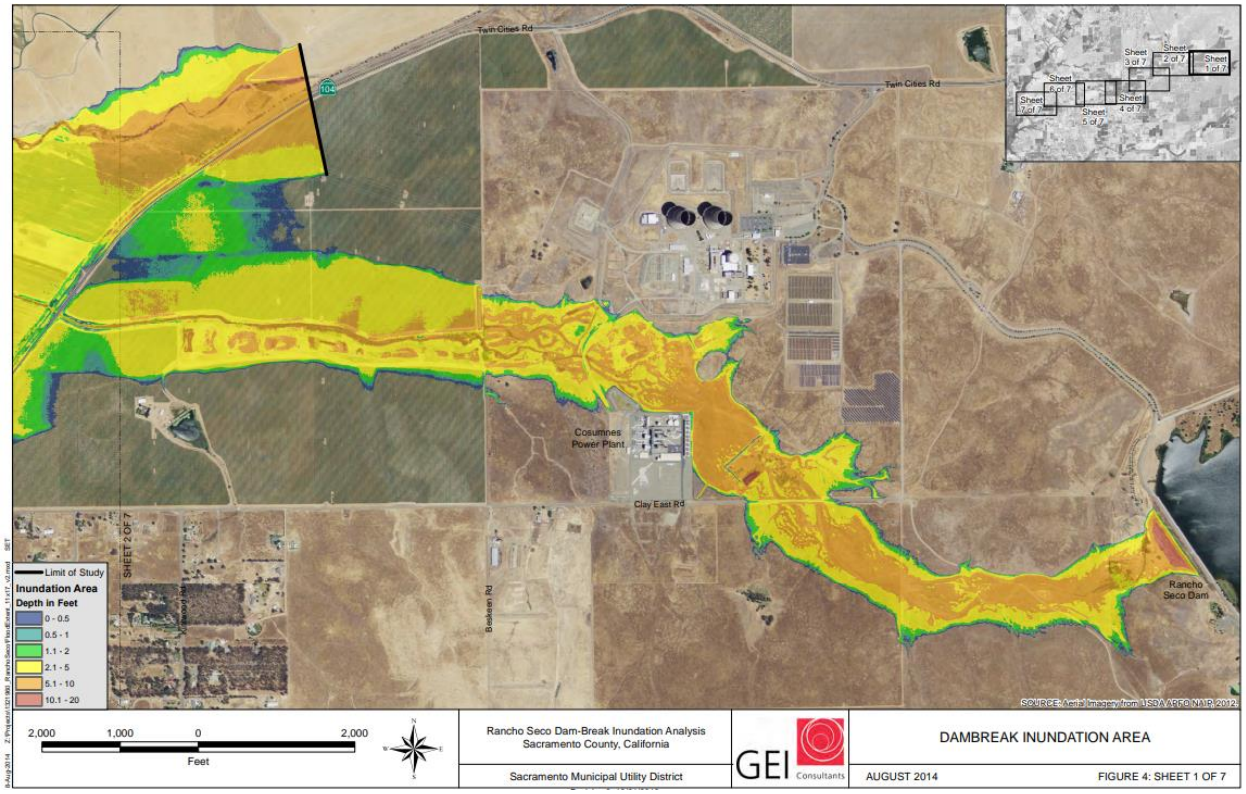
High Hazard Dam Assessment

A failure of one or more of SMUD's high-hazard potential dams would impact communities downstream. Since 2014, all of SMUD's high-hazard potential dams have had emergency action plans, EAPs. All EAPs and subsequent updates have been approved by the California Governor's Office of Emergency Services as required by Senate Bill 92.

SMUD's EAPs were developed through collaborative meetings and consultation with local emergency response agencies: the Sacramento County Office of Emergency Services, Sacramento County Sheriff's Department Herald Fire Protection District, Cosumnes Fire Department, El Dorado County Office of Emergency Services, El Dorado County Sherriff's Office, Placer County Office of Emergency Services, Placer County Sheriff's Office and CalFIRE. In addition, California DWR Division of Safety of Dams, FERC D2SI, the National Weather Service, and the California DWR Division of Flood Management were consulted.

The EAP development process is extensive, it includes the development of technical reports and inundation maps. Figure 19 is an example shown of an inundation map of one of SMUD's high hazard dams, Rancho Seco Dam.

Figure 19: Rancho Seco Inundation Map



Frequency and Severity

A catastrophic dam failure could exceed the capability of affected emergency response agencies. Damage control and disaster relief support would be required from other local governmental and private organizations, state and federal governments, and other utilities.

While some of SMUD's dams are located upstream from unpopulated areas and large reservoirs, most are not. Failure of Union Valley Dam, for example, could result in widespread flooding of large parts of Sacramento and cause over 1,000 deaths.[35]

SMUD continues to minimize the impact of dam failure on the local community by complying with the FERC and Cal OES requirements to engage in EAP activities associated with dam failure. An EAP process is a formal procedure that identifies potential emergency conditions at a dam and results in a series of coordinated actions to be taken by a variety of parties to minimize loss of life and property damage in the event of a dam failure. SMUD's EAPs include:

[35] SMUD, 2022, Dam Failure Analysis and Inundation Map, Union Valley Dam, available from DWR website

- A set of procedures SMUD follows to notify downstream emergency management agencies. The sheriff's office with jurisdiction of the downstream area is responsible for the emergency response. They are aware of the potential for dam failure in their area. Every five years emergency response agencies participate in a dam failure response exercise led by SMUD.
- A set of inundation maps recognize high priority dams to aid emergency management agencies in identification of critical infrastructure and/or communities at risk for warning and evacuation planning.
- A detailed plan of coordination and communication between SMUD and emergency management agencies that will apply in the event of emergencies related to actual dam failure at SMUD's dams.
- EAPs are routinely reviewed and must be approved by Cal OES, Department of Water Resources Division of Safety of Dams, and FERC Division of Dam Safety and Inspections.

Past Events
None of SMUD's dams have failed. Table *28* lists recent dam incidents in the Plan Area.

Table 28: Failure of Spillways and Related Facilities Since 1990

Year	Name	Extent of damage
1995	Folsom Dam	Spillway gate failure. Flooding confined to American River Parkway.
1997	Folsom Dam	Holes in floor of the conduit. No flooding occurred.
2017	Oroville Dam	Evacuation of 180,000 people. $870 MM in damages.

12.7 Current Mitigation Efforts for Water Rise Hazards

The DWR Division of Safety of Dams assigns condition assessment ratings to California dams; all SMUD dams were assessed as satisfactory. Satisfactory is the highest rating indicating no existing or potential dam safety deficiencies are recognized. SMUD's dam safety program continues to monitor, assess, and identify ways to mitigate any future potential impacts from a breach of our dams. For high hazard dams, additional dam performance monitoring and surveillance is performed that is required under licensed requirements.

Table 29 depicts the current water rise mitigation efforts SMUD employs.

Table 29: Current Water Rise Hazards Mitigation

Mitigation	Description
Flood Plain Management Plan	Comprehensive planning and floodplain management strategies that is updated regularly.
New infrastructure construction	Following all regulatory codes and considering flood hazards when planning and constructing. Prohibition of development in urban areas not protected up to the California code.

Table 29: Current Water Rise Hazards Mitigation	
Mitigation	**Description**
Update infrastructure	Continuous dam performance monitoring and evaluation to identify necessary dam safety improvements.
Planning	Development of various flood emergency response plans.
EOC	SMUD maintains an EOC to help coordinate real-time incident command, response, and recovery from all emergencies, including those resulting from flood hazards.
Exercises	SMUD holds regular drills and exercises that focus on identifying any gaps in current response plans. Includes representatives from local, state, and federal agencies.
Flood communications coordination guidance	Focuses on internal and external communication during a flood event.
Elevation	Conducting studies and elevating structures and facilities in vulnerable areas as appropriate.
Water collection	Installation of strategic storm drains to increase storm water collection capacity in vulnerable areas.
Diversion systems	Construction of floodwalls and concrete swales as diversion systems.
Ongoing evaluation	Continued evaluation of potential risks and controls to determine future studies or mitigation initiatives as appropriate.
Repair and maintenance	Assessment for repair, replacement, or maintenance of underground pipelines to be more flood resistant in flood prone areas.
Continuous assessment and mitigation	SMUD continues to assess risks associated with dam failures and system hardening from water rise. Mitigations will be identified through this process and be prioritized for implementation as appropriate.

13.0 Earthquakes and Geological Hazards

SMUD's Plan Area is susceptible to liquefaction, subsidence, landslides, earthquakes, and volcanic activity. Volcanic activity is a potential predecessor/cause of earthquakes whereas subsidence, liquefaction, and landslides can be products of earthquakes. Northern California is at high risk of earthquake and other geological occurrences due to the proximity of the San Andreas Fault system and several nearby volcanoes.

The loss of electric power due to earthquake can occur from many related effects of a violent ground shake. Landslides can damage power line structures (poles/towers), substations, and switchyards. Liquefaction can cause misalignment of the power train of electric plants. Other SMUD assets vulnerable to earthquake damage include natural gas pipelines, liquid storage facilities, water supply systems, dams, communication systems, transportation systems, and disposal systems. Most of these assets rely on electric power. A disruption in the supply of electric power could have extremely detrimental impacts to SMUD and the community. Damages to gas pipelines and excessive flooding could lead to loss of life and economic impact.

For example, a major earthquake could cause damage and possible failure of Nimbus and/or Folsom Dam. Evacuation of persons in the inundation area would be necessary. The damage and/or possible failure of either dam could severely damage SMUD's energy system. It is not feasible to accurately forecast the severity of such an incident.

Power outages or power reductions can be expected throughout SMUD's service area. Downed power lines are a potential hazard and could complicate emergency response efforts. Substations and other portions of the infrastructure, especially the underground equipment, may be particularly susceptible to damage. Administrative facilities may be subject to damage. In addition, transmission facilities outside the service area may be damaged and limit the import capabilities, thus limiting the total amount of energy available for distribution and other operations. Generation facilities may experience interruptions or may be taken offline due to shaking or loss of load.

The immediate physical, emotional, and social impact on the population would be varied and complex. In the hardest hit areas, there could be deaths and many injuries. Many could have their homes destroyed, others driven from their homes by the lack of water and/or power, leaking gas, flooding and so on.

13.1 Earthquake

The United States Geological Survey (USGS) describes an earthquake as both the sudden slip on an active fault and the resulting shaking and radiated seismic energy caused by the slip. Liquefaction can be a secondary effect of seismic activity on specific types of soil. This could result in differential settlement, dam failures, landslides, tsunamis, and loss of critical infrastructure. Human life is also at high risk during an earthquake event. Earthquakes represent the most destructive source of hazards, risk, and vulnerability, in terms of both recent state history and the probability of future destruction of greater magnitudes than previously recorded.

13.1.1 Hazard Profile

Location

California is vulnerable to earthquakes because the state sits atop the boundary between two of the earth's tectonic plates, the Pacific Plate, and the North American Plate. These two plates are constantly moving at a relative rate of two inches per year. The primary boundary between these two plates is the San Andreas Fault, which is more than 650 miles long and extends to depths of at least 10 miles. Many other small faults such as the Hayward and Calaveras faults branch from and join the San Andreas Fault zone. According to the most recent information provided by the California Earthquake Authority, there is greater than a 99% chance that a magnitude 6.7 or greater earthquake capable of causing extensive damage and loss of life will occur in California within the next 30 years.[36] Moreover, minor earthquakes not associated with faults occur weekly.

Frequency and Severity

There are several faults known to exist within or near SMUD's Plan Area that could affect SMUD's energy system. In the eastern part of Sacramento County, the Bear Mountain and

[36] Source: "CEA." California Earthquake Authority, https://www.earthquakeauthority.com/.

Melones Faults are found. They are believed to have been inactive for the past 150 million years. The Bear Mountain Fault passes beneath the west end of Folsom Lake.

No faults are currently known to exist within the City of Sacramento portion of the County. It should be noted that significant earthquakes have occurred on previously undetected faults. Although no faults exist there, Sacramento does feel residue from ground shaking because of radiated seismic energy.

The threat of earthquake damage in SMUD's Plan Area comes from earthquakes along Northern California's major faults, which are the Green Valley, San Andreas, Calaveras, and Hayward faults. A major earthquake on any of these faults could cause shaking within the Plan Area to an intensity of V to VIII on the Modified Mercalli Intensity Scale, which means damage might be expected only in poorly built structures. Assets closer to the fault will experience stronger intensity than those further away.

SMUD's operations depend on infrastructure which is owned and/or operated within the regions of the Delta, Sierra Nevada and Greater Sacramento areas, Greater Bay Area, and the Shasta Cascade as defined by the California Earthquake Authority.

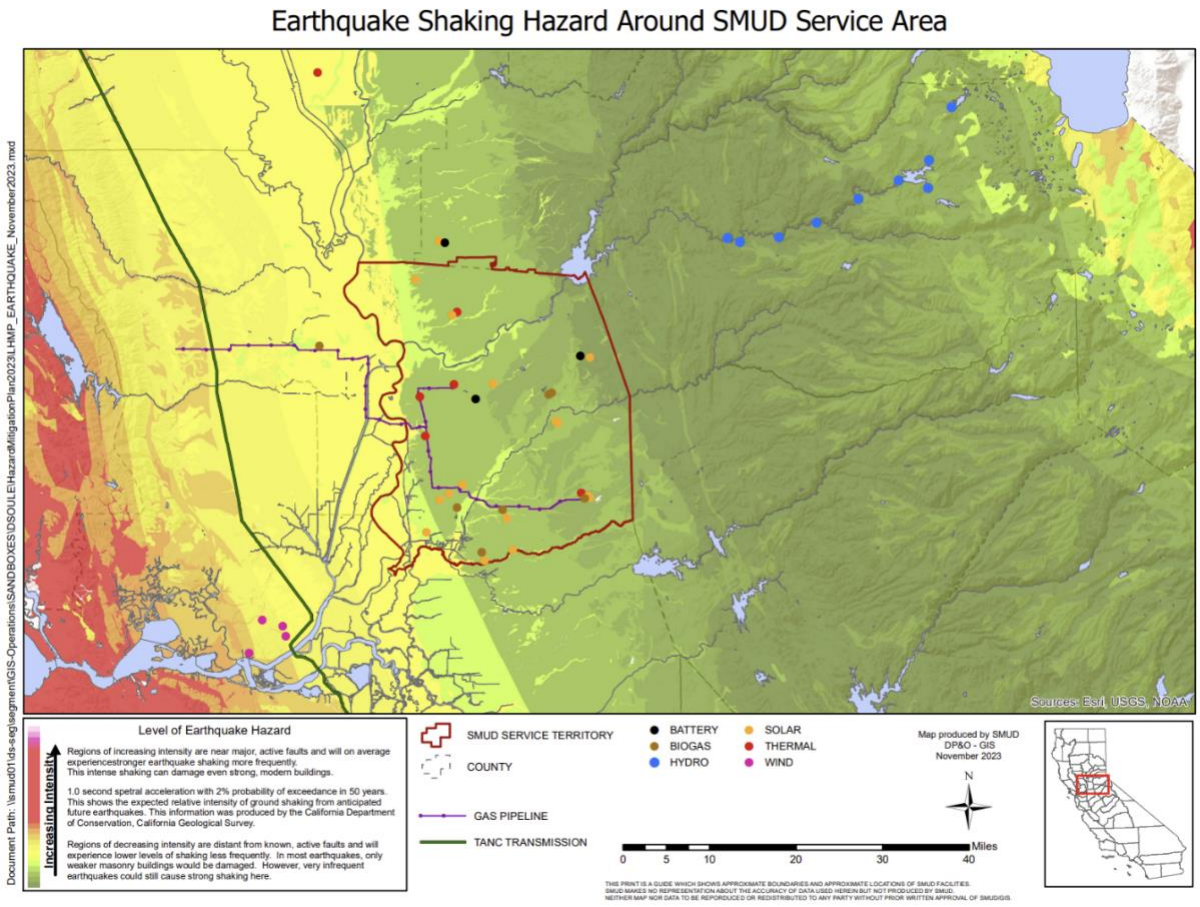
The Plan Area has a high risk of a major earthquake (7.0 magnitude or higher) occurring within 50km in the next 30 years, approximately 77%[37].

A major earthquake which impacts SMUD's Plan Area could cause a great many casualties, extensive property damage, fires, flooding, and other types of hazards. The effects of an earthquake could be aggravated by aftershocks and by the secondary effects of fire, landslides, and dam failure. The time of day and season of the year could potentially also have a profound impact on the number of fatalities and/or injuries and the amount of damage sustained. Such an earthquake could be catastrophic in its effect on the population and could exceed the response capability of the state and local communities. Damage control and disaster relief support would be required from other local governmental and private organizations, state and federal governments, and other utilities.

Extensive research and rescue operations may be required to assist trapped or injured persons. Emergency medical care, food, and temporary shelter would be required for injured or displaced persons. Following an earthquake, mass evacuation may be essential to save lives, particularly in areas below dams. Emergency operations could be seriously hampered by the loss of communications and damage to transportation routes within, and to and from, the disaster area(s) and by the disruption of public utilities and services. Figure 20 shows the relative intensity of ground shaking potential in SMUD's Plan Area from anticipated future earthquakes.

[37] Earthquake Authority, *Understanding the Earthquake Risk Where You Live*, https://www.earthquakeauthority.com/California-Earthquake-Risk/Faults-By-County, October 26, 2023.

Figure 20: Earthquake Shaking Hazards around SMUD Service Area



Past Events

The largest earthquake within 30 miles of Sacramento occurred in 1978 with a 4.4 magnitude. The largest earthquake within 30 miles of El Dorado County was a 2.9 in 1994. The largest earthquake within 30 miles of Yolo, CA was a 4.4 Magnitude in 1978.[38]

Table 30 identifies the HMP counties located within the respective earthquake regions.

Table 30: Counties Located Within Corresponding Earthquake Regions

Region	County
Delta, Sierra Nevada, and Greater Sacramento	• Colusa • El Dorado • Sacramento • San Joaquin • Sutter • Yolo

[38] California Earthquake Authority, https://www.earthquakeauthority.com/California-Earthquake-Risk/Faults-By-County, October 30, 2023.

Table 30: Counties Located Within Corresponding Earthquake Regions	
Region	**County**
Greater Bay Area	• Alameda • Contra Costa • Solano
Shasta Cascade	• Glenn • Modoc • Shasta • Siskiyou • Tehama

13.2 Fault Rupture

A fault rupture occurs when one segment of the earth's crust slides past another and a store of elastic energy is released as an earthquake. The resulting fracture is referred to as a fault. The sliding of the segments of earth on either side of the fault is referred to as the rupture. The fault rupture, aside from releasing an earthquake, can damage any structures or utility infrastructure around it, as the earth's surface becomes displaced.

Frequency and Severity

No major, active faults traverse SMUD's Plan Area. However, there is a multitude of subsurface faults in the Delta. Additionally, active faults do exist near SMUD's Plan Area that could have a detrimental impact on SMUD's infrastructure if a high intensity earthquake event were to take place (see Table 31). Table 32 shows the active faults by county.

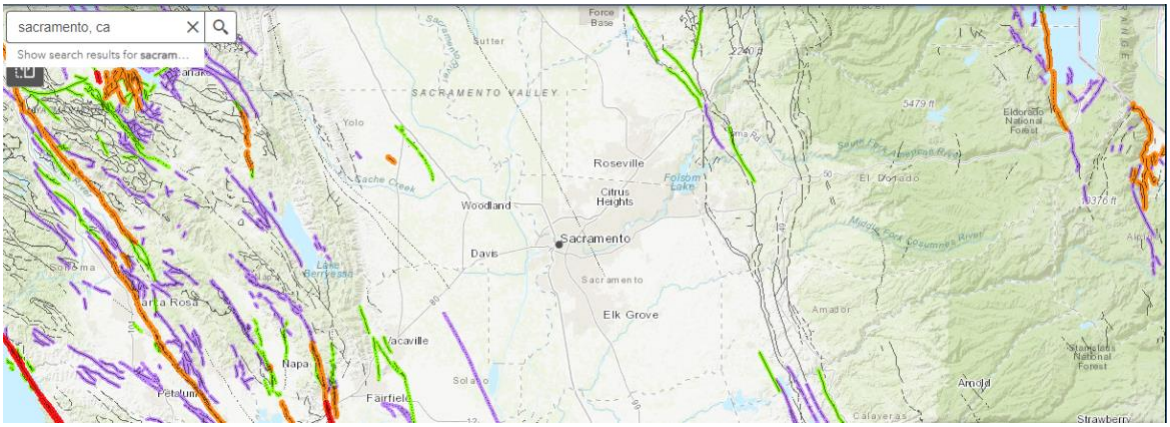
Table 31: Active Faults in the Area Surrounding SMUD [39]			
Fault Name	**Approximate Distance from West Sacramento (miles)**	**Historical Seismicity**	**Probable Intensity**
San Andreas	80	1906 (8.25)	7.5
Vaca	35	1892 (6.5-7)	6.0
Hayward	60	1836, 1868 (7.25)	6.5-7
Calaveras	50	1861 (6.5-7)	6.5-7
Concord-Green Valley	45	1955 (5.4)	6.0
Midland	20	1895	6.9
Dunnigan Hills	18	Unknown	6.0
Foothill Fault	25	1975	6.0

Table 32: Active Faults by County [40]			
County	**Notable Faults**	**Proximity to a Major Fault (miles)**	**Additional Regional Risk**
Alameda Contra Costa Santa Clara Solano	San Andreas Hayward	<10	Landslides Liquefaction
Colusa El Dorado San Joaquin Stanislaus Sutter Yolo	Cleveland Hills Sierra Nevada San Joaquin		Landslides Liquefaction Levee failure
Fresno	San Andreas Garlock San Joaquin		Landslides Liquefaction Levee failure
Glenn Modoc Shasta Siskiyou Tehama	Cleveland Hills Sierra Nevada	20	Landslides Liquefaction
Kern Kings Merced Placer Sacramento	San Andreas Garlock San Joaquin		Landslides Liquefaction Levee failure
San Benito	San Andreas San Gregorio	<15	Landslides Liquefaction
San Bernardino	San Andreas San Jacinto	<10	Landslides Liquefaction

Figure 21 shows a map of the Sacramento area with the surrounding fault lines nearby.

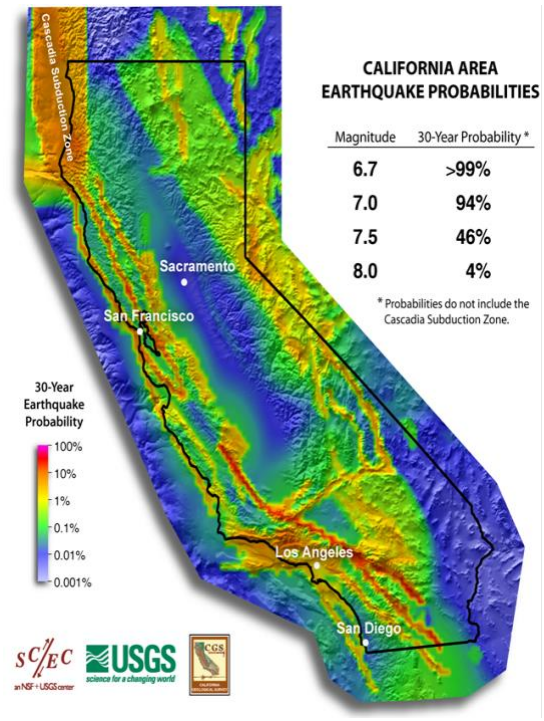
[40] California Earthquake Authority earthquakeauthority.com, October 9, 2023

Figure 21: Fault Activity Map Surrounding the Sacramento Region[41]



A fault rupture, causing an earthquake event, can lead to many detrimental residual hazards. Relative to the rest of the state of California, SMUD is at a low risk for the likelihood of a fault rupture and its residual effects (See Figure 22). Nonetheless, SMUD still has assets that remain vulnerable to shaking from fault ruptures among active faults in California and Nevada, as well as earthquakes not associated with fault rupture. Failure of these assets could lead to loss of both life and crucial infrastructure in SMUD's Plan Area.

Figure 22: California Earthquake Probabilities[42]



[41] California Department of Conservation, *Fault Activity Map of California,* interactive map: https://maps.conservation.ca.gov/cgs/fam/m, October 26, 2023.

[42] *USGS*

13.3 Liquefaction

Liquefaction is one of the potential hazards that is a secondary effect of an earthquake. Liquefaction occurs when seismic ground shaking suddenly temporarily causes saturated soil to lose strength and firmness. Material that is normally solid begins to behave as a dense liquid. The effect is similar to a structure on quicksand. If the liquefied layer is on the subsurface, structures upon it will begin to move laterally.

Liquefaction is most likely to occur in areas where the groundwater level is shallow.

13.3.1 Hazard Profile

Location

Conditions such as liquefaction are most common in areas where alluvial soil is present. Alluvial soil is most prevalent in places where sandy sediments have been deposited by rivers, in moderate to large canyons, and areas in which wave action has deposited sediment along a beach. Bridges, wharves, piers, and underwater utility lines are most susceptible to the negative impacts of liquefaction.

In SMUD's Plan Area, the Delta and downtown Sacramento are at the greatest risk to liquefaction. Though SMUD's Plan Area has not endured any major earthquake events in recent history, there are at least five faults that lie near the Delta that can generate peak ground acceleration. The 1,100 miles of levees that surround the Delta may become unstable under seismic loading. The presence of sand and silt in the levees make liquefaction a very high possibility.

13.4 Subsidence

Subsidence is a sinking of the ground. More specifically, it is deemed as "movement in which there is no free side and surface material is displaced vertically downward with little or no horizontal component."

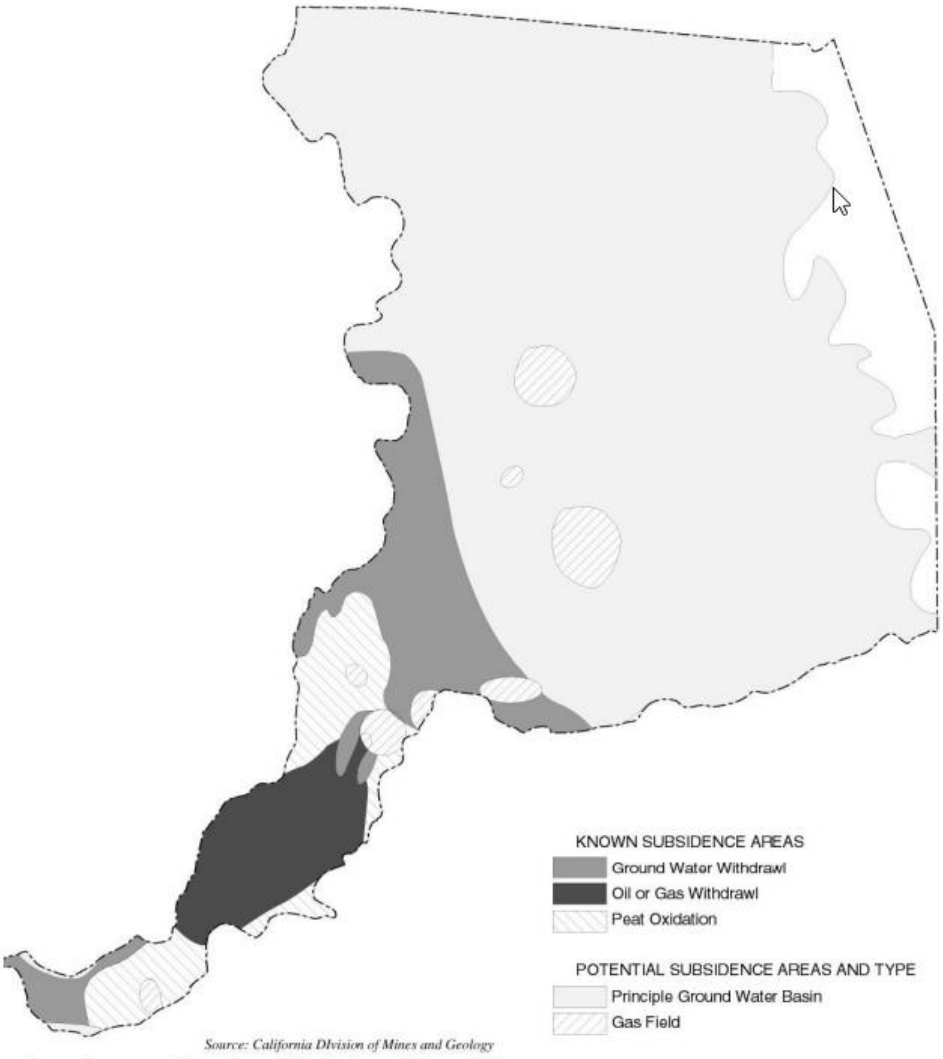
13.4.1 Hazard Profile

Location

SMUD's Plan Area is affected by some unique types of subsidence. The types of subsidence include:

- Earthquake-induced subsidence. This type of subsidence occurs when earthquake shaking causes the compaction of unconsolidated soils.
- Subsidence due to compaction by heavy structures. The Delta levees subside, in part, because of their own weight.
- Subsidence due to wind erosion of peat soils in the Delta.
- Subsidence due to fluid withdrawal. The removal of oil and gas in the Delta has caused some slight subsidence of soils in the Delta. Water withdrawal has been a much more important problem in Sacramento County.
- Subsidence due to peat oxidation in the Delta.

Figure 23: Known and Potential Subsidence Areas in Sacramento County[43]



Source: Sacramento County General Plan Background Report, 2011

Frequency and Severity

Subsidence due to peat oxidation occurs in the Delta. Farmers drain the surface of the soil to plant and plow. When the peat dries out, aerobic bacteria can feed on the peat and convert it to carbon dioxide and other gaseous substances in a process called peat oxidation. Gradually, the peat is disappearing to the bacteria.

The subsidence in the Delta has caused problems for flood control because it places increasing pressure on the levees. These levees keep the surrounding water from inundating lower areas. The increasing hydrostatic pressure caused by the subsidence weakens the levees, necessitating periodic rebuilding. In terms of economic costs, subsidence makes flood protection increasingly expensive.

[43] Source: Sacramento County. 2021 Multi-jurisdictional Hazard Mitigation Plan Update – *July 2021 Public Review Draft*

Past Events
SMUD anticipates that within its Plan Area, if there continues to be drier climates, which removes water from the ground, making it dry, there will be increased risk of subsidence. To date, SMUD has not been impacted by subsidence.

There are no SMUD administrative facilities known to be in areas of existing, ongoing, or potential subsidence. Earth movement and sinking has developed at some substation sites. These conditions have been corrected.

13.5 Landslides

The Plan Area is susceptible to landslides. Landslide refers to a variety of slope instabilities that result in the downward and outward movement of slope-forming materials including rocks, soil, and artificial fill.

13.5.1 Hazard Profile

Location
Most landslides occur during rainy months when soil is saturated with water. Winter storms with intense rainfalls are the most common trigger for landslides. Masses of rock and soils can become detached from steep slopes or cliffs because of earthquakes, flooding, and/or drought and is strongly influenced by gravity, weathering, undercutting, or erosion. Rotational slides caused by the earth movements create a concaved upward movement of soil. This usually results in a bulging "toe" made of the slid material at the bottom of the slide. These types of land movement could cause significant damage to roads, leaving them unsafe to travel on.

Landslide impacts are geographically limited to the area where the slide occurs and are primarily associated with mountainous regions. The potential for larger slides in SMUD's Plan Area exists in the UARP and other mountainous regions. The primary factors that could cause or increase the likelihood of landslides for SMUD are:

- Naturally occurring geological movement including rainfall, water action, seismic, and volcanic activities.
- Excavation and grading on sloping ground for homes, roads, and other structures.
- Drainage and groundwater alterations or breaches.
- Change or removal of vegetation located on steep slopes.

Frequency and Severity
Landslides can occur throughout the Plan Area, though more tend to occur in areas with steeper slops, weaker geology, and high annual precipitation. Landslides may result from several things including natural and human-caused changes in the environment such as heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, changes in groundwater levels and deforestation caused by wildfires. There have been incidents of landslides and general slope failure in isolated portions of El Dorado County, but it is an uncommon occurrence with no defined history of significant damages.

A more detailed landslide hazard assessment requires a site-specific analysis of the slope, soil, rock, vegetation, and groundwater characteristics. Such assessments are often conducted prior to major development projects in areas with moderate to high landslide potential, to evaluate the specific hazard at the development site. SMUD does not have sufficient information to determine the extent of landslides in its Plan Area. It has not been impacted by such an event.

13.6 Volcanoes

Volcanic eruptions are one of Earth's most dramatic and violent agents of change. Not only can powerful explosive eruptions drastically alter land and water for tens of kilometers around a volcano, but tiny liquid droplets of sulfuric acid erupted into the stratosphere can change our planet's climate temporarily.

13.6.1 Hazard Profile

Frequency and Severity
The principal hazards to people in the Pacific Northwest are from lahars and ash fall. Lahars (volcanic mudflows) can destroy buildings and infrastructure. Eruptions that include volcanic ash can be especially dangerous for aircraft, even at long distances from the volcano because volcanic ash can clog and shut down their engines. Explosive eruptions of volcanic particles are followed by effusion of lava flows. High-speed avalanches of hot rock and gas can accompany columns of tephra collapse or the fronts of lava flows crumble, both of which can send pyroclastic flows down the volcano's flanks. Finally, when the erupted material mixes with river water or melts snow and ice, volcanic mudflows sweep down valleys and can devastate areas more than 50 miles downstream. Rivers can continue to carry volcanic sediment downstream and force flooding for decades to hundreds of years. The most significant threats are from volcanic ash and from the slurry of mud and debris within lahars. Even in the absence of eruption, the flanks of Cascade volcanoes can collapse, which result in landslides and debris avalanches that can destroy areas downslope from the collapse location.

Volcanoes pose multiple types of hazards, and the initiation and duration of eruptions is relatively uncertain. Therefore, authorities and populations at risk, both close to and far from the volcano, must be knowledgeable about volcanic hazards so that they can be flexible and prepared in their response.

Eruptions often force people living near volcanoes to abandon their land and homes, sometimes forever. Those living farther away are likely to avoid complete destruction, but their cities and towns, crops, industrial plants, transportation systems, and electrical grids can still be damaged by tephra, ash, lahars, and flooding.

Fortunately, volcanoes exhibit precursory unrest that, when detected and analyzed in time, allows eruptions to be anticipated and communities at risk to be forewarned. The warning time preceding volcanic events typically allows sufficient time for affected communities to implement response plans and mitigation measures.

SMUD has not experienced a volcanic event, there is not sufficient data to describe the extent of potential damages.

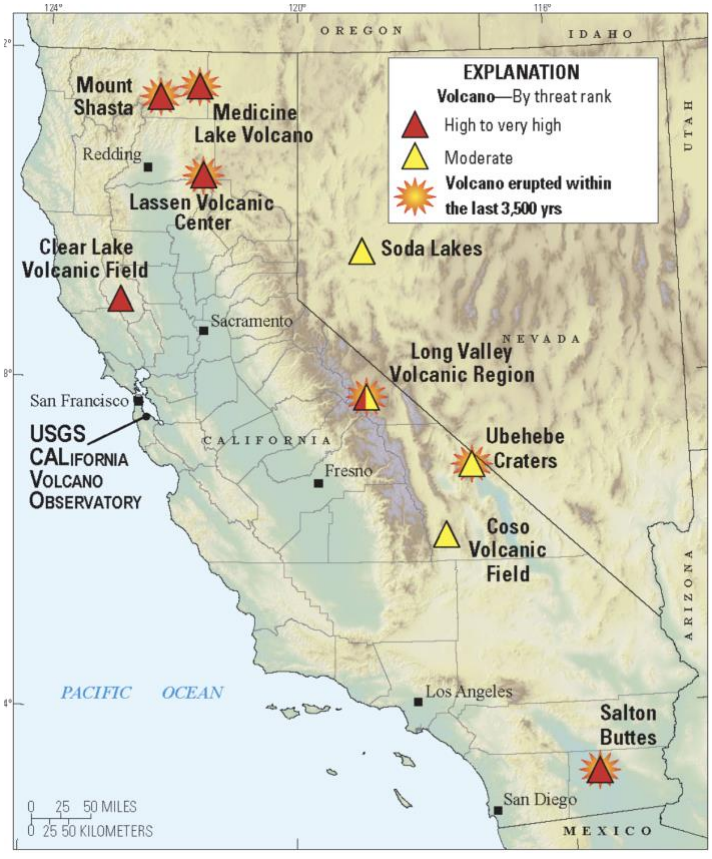
Past Events

The plan region is home to several Cascade volcanoes and the Long Valley Caldera. The volcanoes, their locations, most recent activity, and threat potential are outlined in table 36. California's active and hazardous volcanoes are portrayed in figure 33.

Table 33*: Historical Volcanic Activity*[44]

Volcano	County	Most Recent Eruption	Threat Potential
Long Valley Caldera	Mono	16,000-17,000 years ago	Very high
Mt. Shasta	Siskiyou	3200 years ago	Very high
Lassen Peak	Shasta	1914	Very high
Medicine Lake	Siskiyou & Modoc	950 years ago	High
Brushy Butte	Shasta	Holocene	Low to very low
Silver Lake Volcanic Field	Shasta	Holocene	Low to very low
Tumble Buttes	Shasta	Holocene	Low to very low
Twin Buttes	Shasta	Holocene	Low to very low

Figure 24: California Active and Hazard Volcanoes



[44] *Source: Meyers and Driedger, 2008 https://volcanoes.usgs.gov/observatories/calvo/*

Hazard response and coordination plans are multi-agency efforts that define the responsibilities and actions to take in the event of a restless or active volcano. Scientists from the five regional volcanic observatories of the USGS Volcano Hazards Program participate in developing these plans with state and local governments of at-risk areas. If volcanic unrest or an eruption occurs, scientists from the observatories will keep state and local officials informed of potential hazards so that coordination and response plans can be updated as needed.

13.7 Current Mitigation Efforts for Geological Hazards

SMUD's mitigation efforts for earthquake and geological hazards events are uniform with the requirements of the State of California. A list of current mitigation activities is depicted in table 34 below.

Table 34: Current Geological Hazards Mitigation

Mitigation	Description
Mapping	SMUD has identified all site-specific earthquake hazards and has created an identification map with operational emergency processes for the recognized seismic events that could occur, could trigger reinspection of certain assets as appropriate.
Adhering to codes	SMUD follows all current building codes and makes regular structural improvements to its facilities. Critical facilities are subject to more scrutinizing and innovative regulations and mitigation measures.
Vulnerability assessment	SMUD regularly assesses its water supply, oil, and natural gas pipelines for potential failure during an earthquake event. SMUD's high hazard potential and significant hazard potential dams in the UARP are inspected annually with FERC and DSOD. All dams were found to not fail according to the guidelines.
EOC	SMUD maintains an EOC to help coordinate real-time incident command, response, and recovery from all emergencies, including those resulting from hazards.
Supplier joint-response agreement	Since much of SMUD's critical assets and replacement parts are unique or made to order and the lead-time for manufacturing and delivery of these materials could take up to a year. It is important for the continued operation of the power grid to maintain the health and safety of our community, to participate in a supplier joint response coordination. The coordination allows SMUD to borrow from participating utilities and suppliers, key assets for immediate use.
Gap analysis	SMUD actively practices identification of gaps in current response plans for earthquake events and revises them regularly.
Proper equipment	SMUD utilizes flexible piping, flexible couplings, and above ground fault crossings.
Generators	SMUD utilizes generators in case of power failure.
Training for safe restoration	SMUD trains customers how to reset breakers to help restore electrical power.
Regional agency response coordination	Focus on active participation in city, county, and state emergency management structures for assuring coordinated responses to emergencies.

14.0 Severe Weather and Storms

Severe weather is a weather event that is beyond the range of commonly observed weather patterns in a geographic area. In the SMUD Plan Area, the usual events could include extreme heat, heavy rain, hail, lightning, and strong winds. The full possibility of weather events includes rainfall events, heat waves, storms, unusually cold temperatures, and wind events. California is projected to endure an increase in severe weather events due to climate change.

Severe weather can be viewed in four phases (see table 35) to communicate and coordinate with local agencies, mobilize necessary resources, and support local agencies in recovery efforts.

Table 35: Severe Weather Guidance[45]

Phase	Category	Suggested Criteria	Critical Criteria
I	Seasonal readiness	On-set of summer and winter	Cooler months: Nov-Feb Warmer months: Jun-Aug
II	Increased readiness	Warmer or cooler than normal credible weather predictions	Potential for prolonged abnormal weather conditions and possibility of weather-related power outages.
III	Severe weather alert	Credible forecasts of excessively hot or cold weather conditions: daytime temps for a duration accompanied by specific nighttime temps	Heat: excessively hot weather for three days accompanied by night temps of 75˚F or more. Cold: extreme cold/freeze warning or wind chill warnings indicating extreme weather conditions for three days accompanied by night temps of 32˚F or less.
IV	Severe weather emergency	Extreme weather conditions that could potentially have a life-threatening impact on the population, animals, and agriculture	Heat: heat index of over 105˚F with credible weather forecasts of excessively hot weather for more than three days accompanied by night temps of 75˚F or more. Cold: extreme cold/freeze warnings or wind chill warnings indicating weather conditions that endanger human life with credible weather forecasts of extremely cold/freezing weather for more than three days accompanied by night temps of 32˚F or less.

14.1 Extreme Heat

In the Plan Area, an extreme heat day is defined as a day between April and October in which the maximum temperature exceeds the historical 98th percentile of maximum temperatures for that given day. Cal-Adapt, a web-based climate adaptation planning tool developed by the California Energy Commission defines an extreme heat day, specific to SMUD's plan region as one that exceeds 100˚F. SMUD's concern is the impact of extreme

[45] Source: *Sacramento Operational Area Severe Weather Guidance*
http://www.sacramentoready.org/Documents/Sacramento%20Severe%20Weather%20Guidance.pdf

heat of 100˚F or more over multiple (>3) days. In these instances, it doesn't get cool enough at night to allow for the electric system equipment to cool down, which may cause potential operational disruption.

14.1.1 Hazard Profile

Location

In SMUD's Plan Area, Sacramento's foothill region is at the greatest threat to extreme heat events. The cooling breeze from the California Delta moves the heat from the urban core of the city into the foothills. SMUD has collaborated with the Capital Region Climate Readiness Collaborative to help identify additional areas suffering from such climate problems and create a long-term solution.

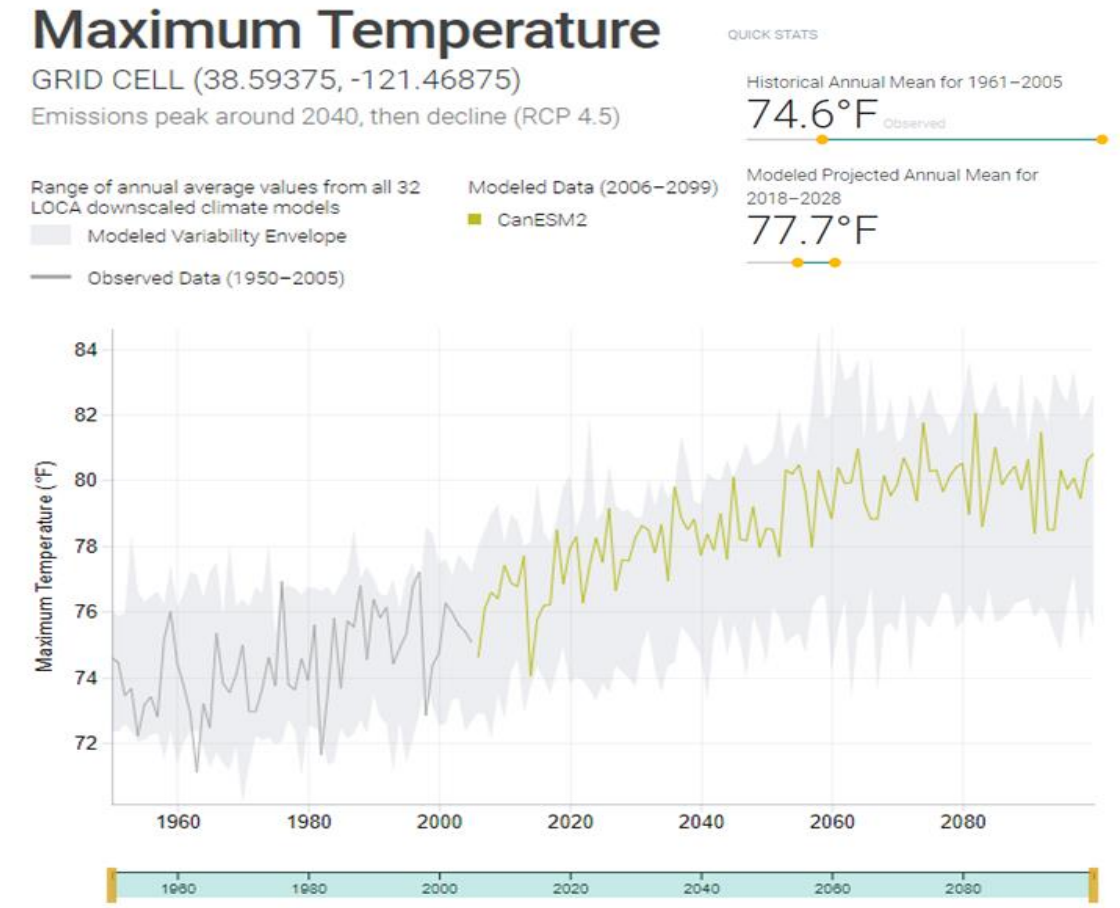
Table 36: Monthly Average and Record Temperatures for Sacramento in Fahrenheit[46]

Date	Average Low	Average High	Record Low	Record High	Average Precipitation	Average Snow
January	41°	55°	19° (1888)	75° (1994)	4.18"	N/A
February	45°	62°	21° (1884)	80° (1985)	3.77"	N/A
March	47°	67°	29° (1880)	90° (1988)	3.15"	N/A
April	50°	74°	34° (1953)	98° (2004)	1.17"	N/A
May	54°	82°	26° (1896)	107° (1984)	0.6"	N/A
June	58°	89°	43° (1929)	112° (1934)	0.18"	N/A
July	61°	94°	47° (1901)	114° (1925)	0.05"	N/A
August	61°	93°	48° (1921)	112° (2020)	0.05"	N/A
September	59°	89°	44° (1934)	116° (2022)	0.37"	N/A
October	54°	79°	34° (1946)	102° (1966)	1"	N/A
November	46°	64°	27° (1880)	86° (1966)	2.59"	N/A
December	40°	55°	17° (1932)	72° (1979)	2.76"	N/A

Due to the impacts of climate change, it is projected that the annual mean temperature for Sacramento will increase by three degrees in the next ten years above the historical average (see figure 25).

[46] Source: *Intellicast*
http://www.intellicast.com/Local/History.aspx?location=USCA0967

Figure 25: Historical Annual Mean Temperature for Sacramento[47]



Frequency and Severity

Extreme heat has always been a characteristic of the Sacramento region and the surrounding areas. However, extreme heat events are now projected to increase in regularity throughout the state of California because of climate change. The heat events are projected to be of a greater intensity, longer duration, and influence a broader geographic area. Average night-time temperatures, especially important for public health and infrastructure, are projected to increase even faster than daytime averages.

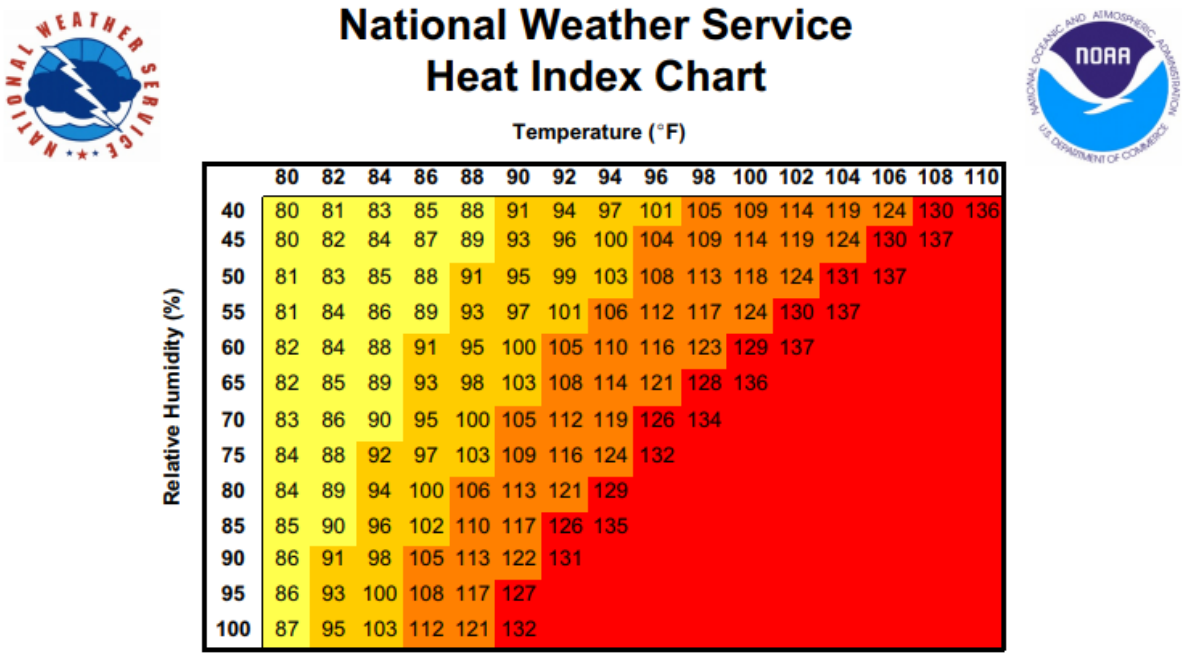
Extreme heat can also be accompanied by increased humidity. Extreme heat combined with increased humidity can pose a serious threat to human life and the longevity of infrastructure in SMUD's Plan Area. A series of extreme heat days occurring consecutively is referred to as an extreme heat event. As climate change continues to affect SMUD's Plan Area, heat events are becoming more prevalent.

The National Weather Service has implemented Impact-Based Decision Support Services (IDSS) which provides improved reporting of heat risk in the SMUD Plan Area. IDSS

[47] Source: *Cal-Adapt*

includes a seven-day forecast based on temperature and other factors and will rate the potential heat risk to the public. IDSS is well suited for the Sacramento Valley's hot, dry climate. This system has the ability identify additional extreme heat events in the Plan Area.[48]

Figure 26: Heat Index Chart and the Potential Effects of Heat on the Body[49]



Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Extreme heat ranks as among the deadliest of all natural hazards. Humidity and extreme heat can provoke a quantity of natural hazards such as dust storms and drought. High temperatures usually coincide with low humidity. High temperatures generally contribute to the evaporation of surface water and moisture from the soil causing the soil to become loose and easier to be carried away by wind. As temperatures increase, it may overload demands for electricity to run air conditioners in homes and businesses.

[48] Source: *National Weather Service*
[49] Source: *National Weather Service*

Extreme heat tends to not affect infrastructure, as heat events are generally limited in length. Infrastructure gets relief between hot and cool temperature cycles. SMUD's biggest points of vulnerability are, given an extreme heat event, an overload demand for electricity to run air conditioners in homes and businesses and the safety of its employees in the field.

Extreme heat is harmful to the population and employees in SMUD's Plan Area. In California, heat-related events annually send 4,300 people to the emergency room and hospitalize an additional 600 for stays longer than one day. In 2006, during one of California's worst heatwaves, 203 deaths were attributed to heat-related events.[50]

The populations that are most vulnerable to heat-related events include the homeless, infants and children under age five, the elderly, individuals with disabilities, individual's dependent on medical equipment, and individuals with impaired mobility.

Past Events

The Plan Area temperatures could range from moderate to extremely high heat. The warmest times of the year are typically the late summer and early fall. The Plan Area has suffered occasional heat events. The sudden spike in temperature has great impact to residents inside and outside the Plan Area and could affect the electric grid. Table 37 depicts available data found for the most recent excess heat events in the NCDC database for the Plan Area.

Table 37: Recent Excessive Heat Events in SMUD Plan Area[51]

County/Zone	Date	Death	Injuries
Central Sacramento Valley	06/17/2017	2	2
Southern Sacramento Valley	06/18/2017	6	0
Southern Sacramento Valley	06/22/2018	0	0
Southern Sacramento Valley	07/24/2018	0	0
Southern Sacramento Valley	08/14/2020	3	0
Southern Sacramento Valley	05/31/2020	0	0
Southern Sacramento Valley	09/07/2021	0	0
Southern Sacramento Valley	06/10/2022	0	0
Southern Sacramento Valley	09/04/2022	1	1

14.2 Freeze

Extreme cold and freeze is most likely to occur during the winter months, and often accompanies a winter storm. Sustained freezes can cause life loss and health risks to vulnerable populations. Economically, freezes can severely affect agriculture in SMUD's Plan Area, which affects farmers, farm workers, packers, and shippers of agricultural products. Freezes can also cause significant increases in food prices to the consumer due to shortages.

[50] Source: *NRDC https://www.nrdc.org/climate-change-and-health-extreme-heat#/map/detail/CA*
[51] *Source: NCDC (www.ncdc.noaa.gov) 13 December 2017*

The NCDC has recorded 22 freeze incidents in SMUD's Plan Area since 1993, resulting in $200,000 in property damage and $5MM in crop damage[52]. In 2013, a six-day freeze event caused more than $440MM in damage to citrus crops throughout the state. Freezes are likely to become less frequent in California as climate change increases average temperatures.

Exposure and Vulnerability

Exposure to extreme cold and freeze may be life threatening since it can cause frostbite or hypothermia. The populations most susceptible to the dangers of freeze are infants and the elderly. Regarding infrastructure, pipes may freeze and burst in homes or businesses that have poor insulation, ice can also form on power lines which could weigh powerlines down, stressing and damaging it. In the most extreme of conditions, freezes can impair communication facilities in SMUD's Plan Area. If freeze is intermixed with warm weather cycles, it may result in an increase in avalanche risk.

Freezing temperatures are usually coupled with high winds and snow which could cause trees to fall into power lines, leading to damage to the infrastructure, impacting electrical reliability.

14.3 Fog

Fog is formed when ice crystals and/or water droplets collect, suspended in the air at the earth's surface. This occurs when the air is cooled to the point that it can no longer contain all the water vapor it has accumulated. In Sacramento, fog season occurs in the late fall and winter. Fog typically forms in the early morning hours, and it can and will last several days at a time.

Table 38: Fog Events in Sacramento County[53]

Date	Deaths	Injuries	Property Damage	Crop Damage
12/11/1997	5	26	$1.5MM	$0
12/18/1998	1	10	$500,000	$0
12/20/1999	0	2	$120,000	$0
01/3/2001	0	0	$0	$0
12/8/2015	0	0	$0	$0
11/4/2020	0	0	$0	$0
01/16/2022	0	0	$0	$0
Total	6	38	$2.1MM	$0

[52] Source: *NCDC*
[53] Source: *NCDC*

It is currently unclear if climate change will have a future effect on fog in the Sacramento area. However, decreasing emissions in the air in response to climate change has resulted in a decline in winter fog events over recent decades.[54]

Fog in the Sacramento area can reduce visibility to mere feet. This can lead to multi-car accidents and have devastating effects on transportation corridors. Severe fog can close roads, cause accidents, and impair the effectiveness of emergency responders. Electric infrastructure along roadways is at risk of accident-related damage. In addition, SMUD's employees are required to drive heavy equipment to conduct work. Increased fog increases risks for drivers and electric workers by limiting visibility. Considering that most of SMUD's Plan Area sits within a valley, it is at risk for dense fog. There is not enough data to determine specific potential extent of fog in SMUD's Plan Area.

14.4 Severe Storms, Hail and Lightning

A thunderstorm is considered severe when it either contains three-quarters of an in-sized hail or winds more than 57.5 miles per hour (mph) - this includes tornadoes. Severe storm events are most prominent during the fall, winter, and spring. Sacramento County averages 18.14 in. of rainfall per year[55].

Hail is created when water droplets are carried upwards, above the freezing level. The droplets freeze, becoming too heavy for the updraft to carry, and fall to the ground. Hail is usually less than two in. in diameter, but it can fall at speeds of 120 mph.

Lightning is a visible electrical discharge caused by a thunderstorm. Lightning can strike as far as five to ten miles from the storm, in areas authorities may not consider to be a direct threat.

Table 39: Severe Weather Events in Sacramento County Since 1950[56]

Event Type	Number of Events	Deaths	Injuries	Property Damage	Crop Damage
Hail	9	0	0	$111,030	$0
Heavy rain	28	0	1	$365,000	$50,000
Lightning	1	0	0	$150,000	$0

Exposure and Vulnerability

Severe storms can cause flooding as well as drainage issues in the Sacramento area. Severe storms also put many assets at risk, as flooding combined with strong winds can result in the failure of very mature trees and other geological hazards.

Hailstorms can destroy roofs, buildings, automobiles, vegetation, and SMUD assets.

[54] Baldocchi and Waller, 2014. https://doi.org/10.1002/2014GL060018

[55] https://fox40.com/news/local-news/sacramento/what-are-sacramentos-rainiest-months-and-what-is-the-citys-average-annual-rainfall/#:~:text=According%20to%20NOAA's%20data%2C%20which,March%20and%20ending%20in%20April.

[56] Source: *Sacramento County Hazard Mitigation Plan*

Lighting can kill or injure employees and people in SMUD's Plan Area. Assets and infrastructure can also be struck directly. These strikes could result in a burn, explosion, or destruction. Lightning can also lead to wildfire if it strikes the surface in a dry region with vegetation high in fuel.

14.5 High Winds and Tornadoes

The National Weather Service (NWS) defines high winds as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration.

High winds can lead to funnel clouds and tornadoes during severe storms. Damages from tornadoes are a result of high wind velocity and wind-blown debris accompanied by lightning or large hail. Each year, an average of 800 tornadoes occurs nationwide, resulting in an average of 80 deaths and 1,500 injuries.[57]

14.5.1 Hazard Profile

Wind speeds during a tornado can reach 300 mph. Unlike hurricanes, which can also produce such wind speeds over great geographic areas, tornadoes are confined to much smaller areas over short distances. SMUD's Plan Area is at a low risk for tornadoes, relative to the rest of the United States. When tornadoes have occurred historically, they have done so at low intensity on the Fujita Tornado Scale[58]. However, if a tornado were to affect the area, it would most likely be in the late fall or early spring.

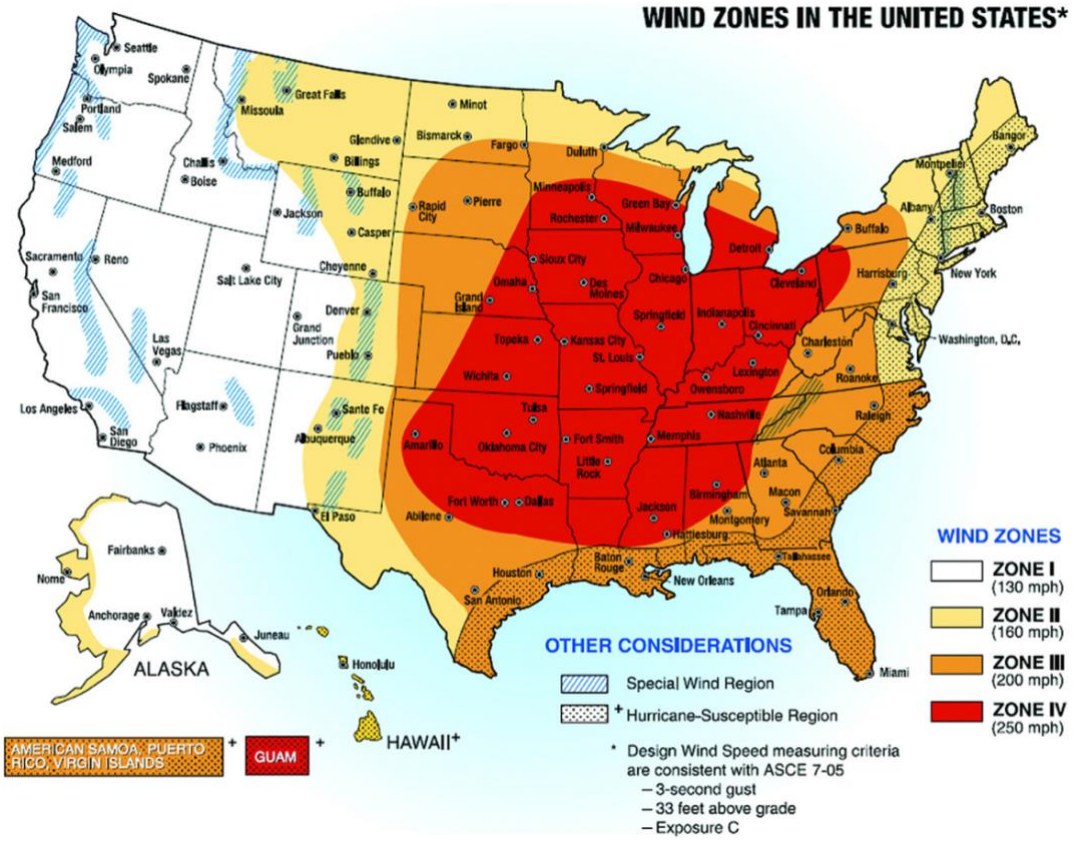
Exposure and Vulnerability

SMUD's Plan Area is at a low risk of hazardous levels of high winds, relative to other areas of the country (see figure 27). However, high winds are a seasonal occurrence that will continue to occur annually in the Plan Area.

57 National Oceanographic and Atmospheric Administration, 2002

[58] Official measure in which tornado intensity is classified

Figure 27: Wind Zones in the United States[59]



Past Events

Fallen trees from high winds in SMUD's Plan Area can damage buildings as well as critical structures, including electrical overhead lines, leading to secondary impacts from fire and power outage as well as serious injury to staff or the public and potential death. The most recent high wind and storm events occurred from late December 2022 to January 2023 causing fallen trees and power outages in SMUD service territory. A selection of recorded high wind events can be found in table 40 below.

[59] Source: *FEMA*

Table 40: Recent Extreme Wind Hazards in SMUD Plan Area[60]			
County/Zone	**Date**	**Type**	**Magnitude**
Motherlode Camptonville	12/09/1996	Winter storm	40
Northeast Foothills Sacramento	12/09/1996	Winter storm	40
Carquinez Strait and Delta	12/09/1996	Winter storm	45
Northern Sacramento Valley	12/09/1996	Winter storm	45
Northern San Joaquin Valley	12/09/1996	Winter storm	45
West Slope Northern Sierra	12/09/1996	Winter storm	
Fulton	09/14/2008	High wind	55 kts. EG
San Joaquin Valley	06/04/2012	Dust storm	
Central Sacramento Valley	12/29/2014	Strong wind	25 kts. MG
Northeast Foothills Sacramento	12/30/2014	High wind	52 kts. EG
Northeast Foothills Sacramento	12/30/2014	High wind	52 kts. EG
Northeast Foothills Sacramento	12/30/2014	High wind	57 kts. MG
Northern Sacramento Valley	12/30/2014	Strong wind	38 kts. MG
Motherlode Camptonville	12/30/2014	Strong wind	43 kts. EG
Southern Sacramento Valley	12/30/2014	Strong wind	35 kts. EG
Southern Sacramento Valley	12/30/2014	Strong wind	40 kts. MG
Northern Sacramento Valley	12/31/2014	High wind	50 kts. EG
Southern Sacramento Valley	01/07/2019	High wind	43 kts. MG
Southern Sacramento Valley	01/18/2021	High wind	49 kts. MG
Carquinez Strait and Delta	10/10/2021	High wind	46 kts. MG

[60] Source: *NCDC*

Table 40: Recent Extreme Wind Hazards in SMUD Plan Area[60]			
County/Zone	**Date**	**Type**	**Magnitude**
Southern Sacramento Valley	10/10/2021	High wind	43 kts. MG
Southern Sacramento Valley	12/13/2021	High wind	49 kts. MG
Sacramento Valley	12/18/2022-01/15/2023	High wind	52 kts. EG
Tehama County	01/14/2023	Thunderstorm wind	48 kts. EG

(Strong winds ≥ 25 *kts., high winds* ≥ 35 *kts.)*

High winds, particularly those accompanying severe storms, can result in significant property and crop damage. Most hazardous to SMUD's Plan Area, high winds can exacerbate existing weather conditions, and increase the speed at which wildfire travels. Through the damage of roofs and structures, or residual damage caused by fire, winds can have a serious impact on the functional operation of SMUD assets.

High winds can result in power loss and business closures. Winds can also affect fog, dust, and snowstorms. Wind events have caused greater than $14MM in damage in SMUD's Plan Area since 1955 (see table 41).

Table 41: Wind Events in Sacramento County Since 1993[61]					
Event Type	**Number of Events**	**Deaths**	**Injuries**	**Property Damage**	**Crop Damage**
High wind	40	1	0	$9MM	$39,000
Strong wind	26	0	2	$3.7MM	$0
Thunderstorm wind	9	0	0	$50,000	$0
Tornado	13	0	0	$1.5MM	$0
Total	88	2	2	$14.2MM	$39,000

Tornadoes have similar damaging potential to that of high winds. A tornado is likely to damage buildings, cause trees to fall, damage power lines, break gas lines, break sewer and water mains, and cause fires. Access to hazard recovery might also become impaired due to a tornado, as roads can be destroyed or blocked by debris.

While there are incidents of tornadoes in SMUD's Plan Area, it poses a relatively low risk for most of the area compared to states located in the Midwest and South of the nation. The Plan Area is subject to strong winds associated with powerful winter cold fronts. Strong winds because of tornadoes could have an impact to reliability, could cause increased risk of fires and cause damages to SMUD infrastructure. Table 42 below depicts the recorded tornadoes for the Plan Area and the extent of damage as defined by the F-Scale.

[61] Source: *Sacramento County Hazard Mitigation Plan*

Table 42: Record Tornadoes 1925 to Present[62]			
Year	**County Impacted**	**Total Events**	**Extent F-Scale**
1972	El Dorado	1	0
1978	Sacramento	1	2
1983	Sacramento	1	1
1988	Sacramento	1	1
1989	Solano	1	0
1995	Sacramento	1	0
1998	Sacramento, Solano	1, 1	0, 0
2005	Sacramento, Solano, Sutter, Yolo	4, 1, 2, 2	0, 0, 0, 0
2007	Sacramento	1	0
2011	Sacramento, Solano, Sutter	1, 1,1	0, 0, 0
2012	Sacramento, Sutter	1, 1	0, 1
2015	Sacramento	1	1
2020	El Dorado, Sacramento	1, 1	0, 0

14.6 Current Mitigation Efforts

SMUD mitigates extreme heat by protecting its outdoor workers. SMUD provides adequate water, shade, rest breaks, training, and emergency procedure to ensure the safety of its employees. Employees are constantly evaluated for signs and symptoms of heat illness, especially in temperatures greater than 95˚F. SMUD also has load flexibility and demand response programs in place to address peak load during extreme heat events and the increased use of air conditioning.

SMUD mitigates freeze with warning systems and demand response programs to handle peak load during an increase in the use of electric heating systems.
SMUD mitigates high wind events through wind engineering design and construction of its assets, according to state, federal, and industry standards. To prevent fall in of trees to electrical lines, SMUD's vegetation management program seeks to proactively identify trees as risk of fall in for removal. In terms of storms and fog related accident risk, SMUD power lines are marked and inspected for visibility and integrity. SMUD employees are trained to…

To mitigate severe weather and storm events, SMUD crews assist in maintaining clear channels, canals, and creeks by removing weeds and debris that can halt water flow during severe weather incidents. SMUD holds drills to rehearse floodgate closures to ensure a rapid response during an emergency.

[62] *Source: The Tornado Project (www.tornadoproject.com), NOAA national climate date center, 13 December 2017*

Table 43: Current Severe Weather Hazards Mitigation	
Mitigation	**Description**
Adhering to code	SMUD follows all current building codes and makes regular structural improvements to its facilities. Critical facilities are subject to more scrutinizing and innovative regulations and mitigation measures.
Equipment built to industry standards and standard practice at time of build	Equipment built to applicable standards e.g. structural codes such as IEEE and ASCE7.
Resource priority map	Used to identify the most at-risk people to deploy regional resources to these communities quickly.
EOC	SMUD maintains an EOC to help coordinate real-time incident command, response, and recovery from all emergencies, including those resulting from hazards.
Supplier joint-response agreement	Since much of SMUD's critical assets and replacement parts are unique or made to order and the lead-time for manufacturing and delivery of these materials could take up to a year. It is important for the continued operation of the power grid to maintain the health and safety of our community, to participate in a supplier joint response coordination. The coordination allows SMUD to borrow from participating utilities and suppliers, key assets for immediate use.
Generators	SMUD utilizes generators in case of power failure.
Instruction	SMUD trains customers how to manually shutoff utilities.
Protecting staff	SMUD's People Service and Strategy Team oversees the Cares Program. During a hazard event, the team will conduct outreach to impacted employee's supervisors to determine employee needs and acts as a liaison to get the needed resources to those employees impacted.
Roadway projects	Identify areas of vulnerability for roadway impact from severe weather and prioritize for mitigation from current and future hazard events.
Access to equipment	Contracted with roadway and helicopter vendors so that areas impacted by severe weather hazards are accessible.

14.7 Tree Mortality

Tree mortality refers to the death of trees due to factors such as drought-induced water stress, insect attacks, and high tree density.

14.7.1 Hazard Profile

Frequency and Severity

Increased tree mortality elevates fuel loads, creates hazardous conditions for firefighting personnel, decreases production rates of fire line construction, poses risk of injury and damage from falling branches, and financially impacts property owners. From 2010-2022, 208.6 million trees have died in California. This frequency is expected to increase due to continued climate change. A growth in the rate of tree mortality can affect local, regional, and global carbon budgets[63]. Table 44 below depicts the estimated number of trees that have died each year since 2010.

Past Events

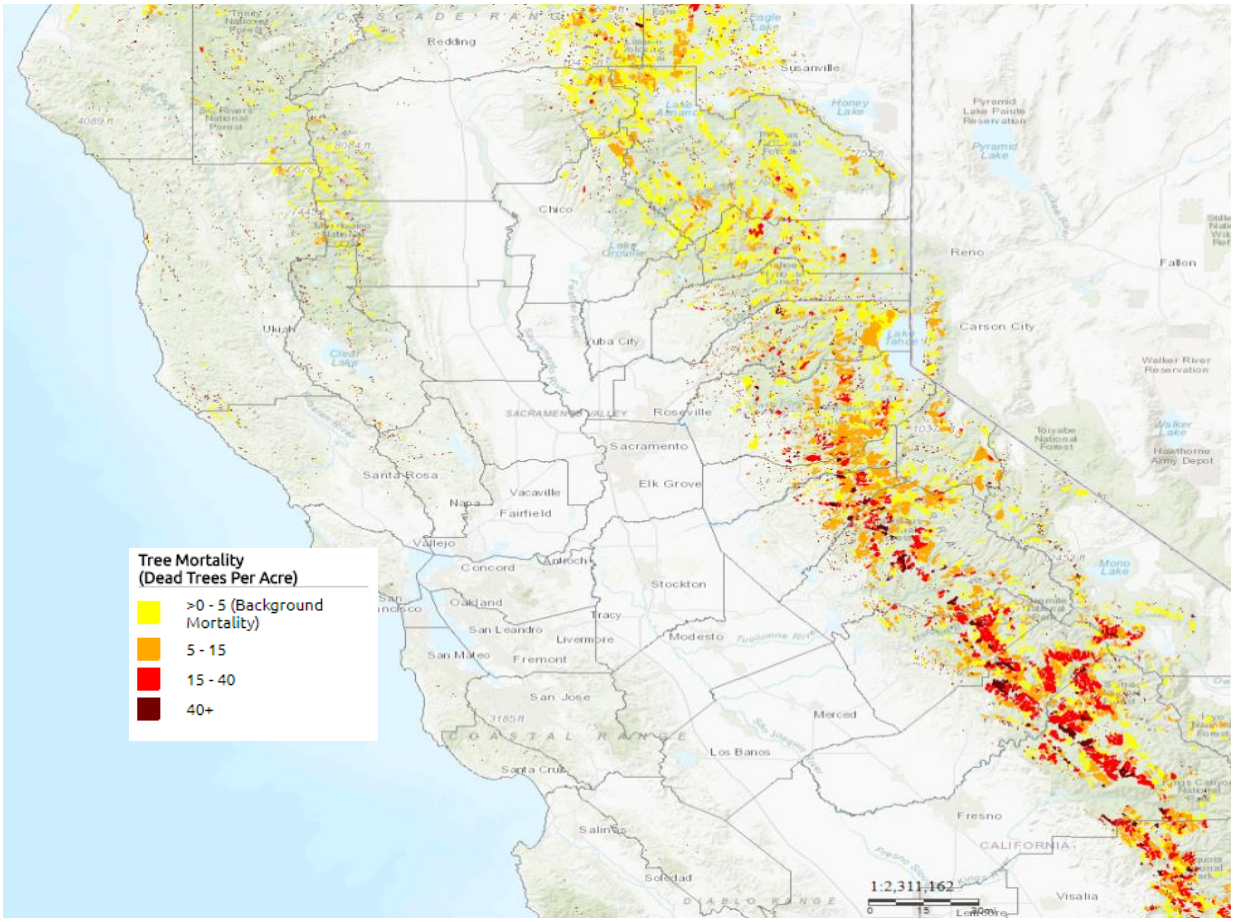
Table 44: Estimated Cumulative Number of Dead Trees in California[64]	
Year	**Estimated Number of Dead Trees**
2010	3.1 million
2011	1.6 million
2012	1.8 million
2013	1.3 million
2014	3.2 million
2015	29 million
2016	62 million
2017	27 million
2018	18.6 million
2019	15.1 million
2021	9.6 million
2022	36.3 million
Total	208.6 million

*2020 no data surveyed due to pandemic. Years after 2020 may not be as accurate.

[63] Living trees take in carbon dioxide while dead trees release carbon dioxide.

[64] Source: *CalFire*

Figure 28: 2017 Aerial Detection of Tree Mortality in Northern California
[65]



14.7.2 Exposure and Vulnerability

Increased wildfire risk associated with tree mortality has resulted in a major reorganization of the forest's ecosystem. SMUD's Plan Area is expected to see a decline in forest productivity, a change in species composition, a shift to smaller sized trees, and a reduction in forest extent in some regions. There is no data to show how many trees in SMUD's Plan Area are dead and/or dying. SMUD does not record the number of trees that it removes as a result of tree mortality. Its vegetation management program removes trees under and adjacent to transmission and distribution lines to increase safety, reliability, and decrease wildfire risks.

[65] Source: *Department of Forestry and Fire Protection*

14.7.3 Current Mitigation Efforts

Table 45 depicts the current mitigation efforts for tree mortality.

Table 45: Current Tree Mortality Hazards Mitigation

Mitigation	Description
CalFire partnership with California Natural Resource Agency, US Forest Service, Caltrans, and California Energy Commission (CEC)	Use the dead trees as biomass energy.
Private and public agency coordination	SMUD coordinates and collaborates with private and public entities to identify projects that are mutually beneficial and to improve forest health.
Vegetation management program	SMUD prunes most trees on a fixed interval, and faster growing trees on a more frequent interval. SMUD identifies dead and dying trees, as a part of its vegetation management program, for removal.
Aerial patrols	Performing annual traditional aerial patrols to identify trees in states of decline.
Remote sensing technology	SMUD uses remote sensing technology to determine tree health using lidar and imagery.

15.0 Energy Shortage

15.1 Background

15.1.1 Hazard Profile

Delivery of electricity service in SMUD's Plan Area has been consistently and highly reliable for most of the century-long development, expansion, and continuous operation of grids across all regions of the Nation. The traditional definition of reliability—based on the frequency, duration, and extent of power outages—may be insufficient to ensure system integrity and available electric power in the face of climate change, natural hazards, physical attacks, cyber threats, and other intentional or accidental damage; the security of the system, particularly cybersecurity, is a growing concern.

Resilience is the ability to prepare for and adapt to changing conditions, as well as the ability to withstand and recover rapidly from disruptions, whether deliberate, accidental, or naturally occurring.[66] While resilience is related to aspects of both reliability and security, it incorporates a dynamic response capability to reduce the magnitude and duration of energy service disruptions under stressful conditions. Infrastructure planning and investment strategies that account for resilience typically broaden the range of risk-

[66] https://www.energy.gov/sites/prod/files/2017/01/f34/Chapter%20IV%20Ensuring%20Electricity%20System%20Reliability%2C%20Security%2C%20and%20Resilience.pdf

reduction options and improve national flexibility through activities both pre- and post-disruption, while also focusing on the electricity-delivery outcomes for the consumer.

15.1.2 Exposure and Vulnerability

Changes in the climate are expected to bring more frequent and extreme weather conditions. Extreme weather conditions have the potential to decrease the efficiency of thermal power plants and substations, decrease the capacity of transmission lines, render hydropower less reliable, spur an increase in electricity demand, and put energy infrastructure at risk of flooding and fire. Similarly, during cold spells, heating demands increase, further stressing the energy infrastructure.

The Sacramento area faced historic storms from New Year's Eve to the early weeks of January 2023, with severe rain, 70-mph winds, and lightning, leading to significant damage and unprecedented power outages. Over 599,000 customers experienced power outages during that period. Additionally, there were 300+ power poles that fell, 1,800 wires down, and 650 downed and broken trees.

15.1.3 Current Mitigation Efforts

SMUD considers several natural hazards during the planning, construction and maintenance stages of its equipment and infrastructure. This may result in new equipment standards, environmental reviews, and risk assessments to help reduce the impacts of the natural hazards of new or existing infrastructure locations. SMUD periodically reviews and revises its projections of long-term energy demand against State requirements as a part of plan for expansion of electric power generation, transmission, and distribution facilities.

Table 46: Current Energy Shortage Hazards Mitigation

Mitigation	Description
Wholesale energy risk management guidelines and directives	Provides guidance and limits on energy requirements.
Resource adequacy requirement	Resource adequacy requirements ensure SMUD is able to meet the peak planned demand for a period.
California Public Utility Commission (CPUC) requirement	The CPUC requires that investor-owned utilities it regulates purchase 15 percent over their forecasted load. SMUD procures resources such that its resources available exceed forecasted demand by at least a 17.5% margin on a monthly basis.
Capacity/Energy Shortage Contingency Plan	Plan outlines additional steps and notifications in the event traders are unable to purchase sufficient energy or resources.

16.0 Climate Change

16.1 Background

The National Aeronautics and Space Administration (NASA) defines climate change as the change in the usual weather conditions and patterns found in a region. More specifically, it is a change in the average weather conditions such as temperature, rainfall, snow, ocean, and atmospheric circulation, or in the distribution of weather around the globe. According to NASA, scientists think that the Earth's temperature will keep increasing for the next 100 years. "This would cause more snow and ice to melt. Oceans would rise higher. Some places would get hotter. Other places might have colder winters with more snow. Some places might get more rain. Other places might get less rain." [67]

California has already been experiencing the impacts of climate change including prolonged droughts, increased coastal flooding and erosion and tree mortality. The state has also seen increased average temperatures, more extreme heat days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow and both snowmelt and rainwater running off sooner in the year. In addition to changes in average temperatures, sea level and precipitation patterns, the intensity of extreme weather events is also changing. More frequent extreme weather events and resulting hazards, such as heat waves, wildfires, droughts, and floods are expected.[68]

16.1.1 Hazard Profile

Climate change has not been identified as being directly responsible for any declared disaster. However, recent studies indicate that past flooding, wildfire, levee failure, drought, and severe weather damages, have been exacerbated by climate change[69]. Climate change is an ongoing hazard that can increase the intensity of the likelihood, velocity and/or impacts of all hazards. The impacts because of climate change generally are long-term effects and are projected to be realized and compounded over several decades, depending on the extent of greenhouse gas mitigation.

Climate change impacts many hazards, and a secondary impact could be land subsistence due to changing geology in the soil. The impacts of land subsidence include damage to buildings and infrastructure such as electrical equipment, substations, etc. Land subsidence in California is attributed to two primary factors, aquifer compaction due to excessive groundwater pumping and decomposition of wetland soils exposed to air after wetland conversion to farmland. According to the US Geological Survey, there have been recorded incidents of land subsidence in the Sacramento-San Joaquin Delta area and in addition to the Sacramento Valley. The Sacramento Valley has suffered elevation losses ranging from 0.73 ft. to 3.9 ft. since 1949.

In SMUD's Plan Area, the impacts of climate change will result in frequent and intense storms, floods, droughts, and heat waves. Potential consequences of these weather-related

[67] Source: https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-climate-change-k4.html
[68] California's Fourth Climate Change Assessment, January 16, 2019. http://www.climateassessment.ca.gov/state/
[69] USGS

hazards include the loss of life and injury, damaged infrastructure, long-term health effects, loss of agricultural crops, disrupted transport, and freight, and much more.

From an operations perspective, climate change means rising energy demand and falling generation and distribution efficiency for the energy sector. Higher ambient temperatures will increase energy demand during the peak summer months by driving use of air conditioning.[70] Rising temperatures will also decrease the efficiency of thermal conversions, meaning that more resources will be required to produce the same amount of energy. In addition to higher temperatures, climate change may bring increased frequency and severity of major weather events, which pose a threat to infrastructure. Changing weather patterns may also affect solar-, wind-, and hydropower generation.[71]

SMUD is an industry leader in innovation and progress in California's effort to reduce greenhouse gases and prepare for climate changes. In 2012, SMUD produced its first targeted climate readiness study and adaptation strategy. The review included a "state of the science" assessment to update scientific findings and incorporate lessons from the California Climate Adaptation Strategy, Adaptation Policy Guide, and numerous other resources. The climate readiness study and adaptation strategy are an integrated plan for addressing climate change. The analysis gives SMUD an opportunity to critically assess climate change risks and strategy and improve its readiness efforts, while providing a venue for sharing and learning best practices, providing transparency to the community, and building on local efforts with other public and private organizations. The study was updated in 2016 to include a Readiness Action Plan that addresses community engagement, enterprise programs, capital projects, and operational initiatives. In 2021, SMUD took a step further by releasing its 2030 Zero Carbon Plan. The plan details the goal of eliminating carbon emissions from power generation by 2030. SMUD has many programs supporting the equitable transformation to clean energy, including building and transportation electrification incentives, electric vehicle test drives, and partnerships to develop new technologies and strengthen the renewable energy grid.

16.1.2 Current Mitigation Efforts

Table 47 below captures SMUD's existing activities to mitigate climate change risks.

Table 47: Current Climate Change Hazards Mitigation

Mitigation	Description
Department of Energy (DOE) partnership	SMUD continues to partner with the DOE to share information.
Long-term planning	Staff incorporates climate projection scenarios and readiness findings into long-term planning processes at SMUD.

[70] Increased temperatures may also reduce energy demand during winter months, but the reader should note temperature changes in the summer are expected to be larger on a nominal basis then changes in the winter.
[71] University of Cambridge. 2014. Climate Change: Implications for the Energy Sector. Available at: https://www.bmz.de/en/publications/type_of_publication/weitere_materialien/Implications_for_Energy_Briefing_WEB_EN.pdf

Table 47: Current Climate Change Hazards Mitigation	
Mitigation	**Description**
Capital Region Climate Readiness Collaborative	SMUD chairs and participates in the regional adaptation collaborative to leverage existing regional resources to address the impacts of climate change.
Support research	SMUD supports, when appropriate, and helps to fund new research to fill significant gaps in current knowledge about climate change.
Climate Readiness Assessment and Action Plan	Staff reviews and summarizes new scientific conclusions and incorporates them into SMUD's Readiness Strategy every four years as new methodologies warrant.
Zero Carbon Initiative	The 2030 Zero Carbon Plan is a flexible road map to achieve zero carbon by 2030 while ensuring all customers and communities we serve reap the benefits of decarbonization.

SMUD's forward-looking mitigation strategies include:

- Leveraging the best available climate science to make decisions, updating the "state of the science" assessment every four years.
- Continuing to collaborate with multiple local agencies on flood data analysis and preparedness planning.
- Taking proactive measures to make SMUD more resilient.
- Conducting research into the impacts of sustainable forest management techniques on wildfire risk reduction and stream flows.
- Identifying systematic opportunities to integrate climate change projections in internal program planning and capital budget development and approval.
- Investigating opportunities to employ resiliency bonds to finance further readiness measures.
- Supporting and participating in the Capital Region Climate Readiness Collaborative to assist public and private partners in the region improve overall climate readiness.
- Continuing implementation of the 2030 Zero Carbon Plan

17.0 Threat and Social Disturbance Hazards

Threat and disturbance address a symptom of and a form of protest against unfavored decisions. The severity of these actions coincides with the level of public outrage; it could range from blocking or impeding access to a building and disrupting normal activities by generating noise and intimidating people to a full-scale riot that destroys property and terrorizes individuals.

17.1 Terrorism

The Code of Federal Regulations (C.F.R.) defines terrorism as "the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives (28 C.F.R. Section 0.85). Terrorism refers to human-caused hazards and their use of weapons of mass destruction: biological, chemical, nuclear, and radiological weapons, arson, incendiary, explosive and armed attacks, or any devices or vehicles that can be used to cause destruction and/or casualties. Terrorism also includes industrial sabotage, intentional hazardous materials releases, and cyber terrorism. Terrorists have a desired objective to target large public gatherings, water and food supplies, utilities and corporate centers, and communication capabilities.

The three key elements to defining a terrorist event are as follows:

- Activities involve the use of illegal force,
- Actions are intended to intimidate or coerce, and
- Actions are committed in support of political or social objectives.

17.1.1 Hazard Profile

The following (see Table 48) are potential methods used by terrorists that could directly or indirectly impact SMUD's Plan Area:

Table 48: Potential Methods of Terrorist Attacks	
Active Shooter	Arson
Explosive detonation	Biological agent release
Chemical agent release	Cyber terrorism
Kidnapping/Hostage-Taking	Nuclear Detonation
Radiological incident	Vehicle Ramming Attack

Frequency and Severity

SMUD owns critical infrastructures as defined by the Department of Homeland Security. These critical infrastructures are more vulnerable to terrorist attacks. Since September 11, 2001, the number of threats involving the use of chemical, nuclear, or biological agents by individuals and terrorist groups wishing to instill fear and disrupt communities within the United States has escalated. However, to date, SMUD has not experienced a known high-profile attack by groups or individuals associated with international terrorist organizations. Nor has SMUD experienced an incident involving a biological, chemical, radiological, or nuclear weapon. Nevertheless, domestic terrorist incidents such as the December 3, 2022, Moore County NC Substation Ballistic Attack have led to heightened security efforts for the Plan Area.

An explosive or electromagnetic pulse detonation occurring anywhere in California could have a critical impact on SMUD's energy system and/or its ability to maintain continuity in electric service. A targeted attack on SMUD could result in catastrophic damages to its

electric system as well as its staff, customers, and the community. Damages could include casualties, extensive property damage, fires, flooding, and other ensuing hazards. Such a detonation could be catastrophic in effect on the electrical system and could exceed SMUD's response capability. Emergency operations may be seriously hampered by the loss of communications and damage to transportation routes within the disaster area as well as the disruption of other public utilities and services. Extensive mutual aid and State/Federal assistance could be required and could continue for an extended period.

Damage to SMUD's power plants and ancillary facilities in affected areas can be expected to reduce generating capacity significantly. The potential impact of this reduction in local output is lessened by the availability of power from other sources outside the affected area and by relational reduction in consumer demand. Immediate concerns will focus on repairs necessary to restore power to areas of greatest need. Major restoration problems include supplying chain disruptions, repairs necessary to route power through the major substations, restoration of damaged and collapsed transmission line towers, re-activation of equipment at local substations, replacement of fallen poles, burned transformers, etc. The following table depicts SMUD's current mitigation efforts of terrorism hazards.

17.1.2 Current Mitigation Efforts

Table 49: Current Terrorism Hazard Mitigation

Mitigation	Description
24/7 security patrols	Compensatory checks and alarm responses occur 24/7. SMUD staffing includes a 24/7 security force responsible for monitoring all closed-circuit television systems, responding to security alarms, and performing security inspections, investigations, etc.
Remote location monitoring	SMUD can monitor remotely through Security Operations Centers (SOC) staffed by SMUD Security Operations personnel as well as contract services.
External collaboration	SMUD participates with local, state, and federal agencies for terrorism monitoring and notification.
Physical access management	Fencing, sensors, cameras, and alarms with operational procedures and technology applications that remotely monitor facilities and protect critical assets and resources.
Emergency Operations Plan	SMUD maintains an emergency operations plan which addresses SMUD's preparedness and response policies and procedures for responding to, and recovering from, extraordinary emergency situations that could adversely affect business continuity and the capacity to safely generate, transmit, and distribute electric power to its customers.
Nuclear Response Plan	SMUD maintains an emergency plan that outlines the requirements for SMUD's response to a nuclear release event. The plan is reviewed and tested multiple times annually.

Table 49: Current Terrorism Hazard Mitigation	
Mitigation	**Description**
Emergency Action Plan	Plan that outlines emergency actions to take during hazard event.
Agency coordination and information sharing	SMUD periodically participates with various agencies to learn about and share cyber threat information.
Exercises	Conduct periodic exercises to find opportunities to improve existing processes.

17.2 Cyber Threats

Cyber threats are attempts by criminals to attack a government, organization, or private party by damaging or disrupting a computer or computer network, or by gaining unauthorized access to information on a computer or computer network for malicious use.

17.2.1 Hazard Profile

Exposure and Vulnerability

Cyber based attacks gain access to or intrude on critical infrastructure systems, such as financial services, communications systems, energy, or transportation systems, with the potential to alter their reliable functioning. Disruption to such SMUD's systems could pose a critical threat to local and national security. Over the past years, the threat from cyber terror has grown exponentially in part due to the rapid growth in the use of the Internet and the rapid growth of technology in general.

SMUD collects employee, customer, and vendor information on a continuous basis (e.g., job applications, new customer applications, loan forms) for business operations. As SMUD's electric grid and computer systems become more and more interconnected, and with the increased adoption of new technology (including cloud computing, big data, and mobile device usage), the risk for cyber breach increases.

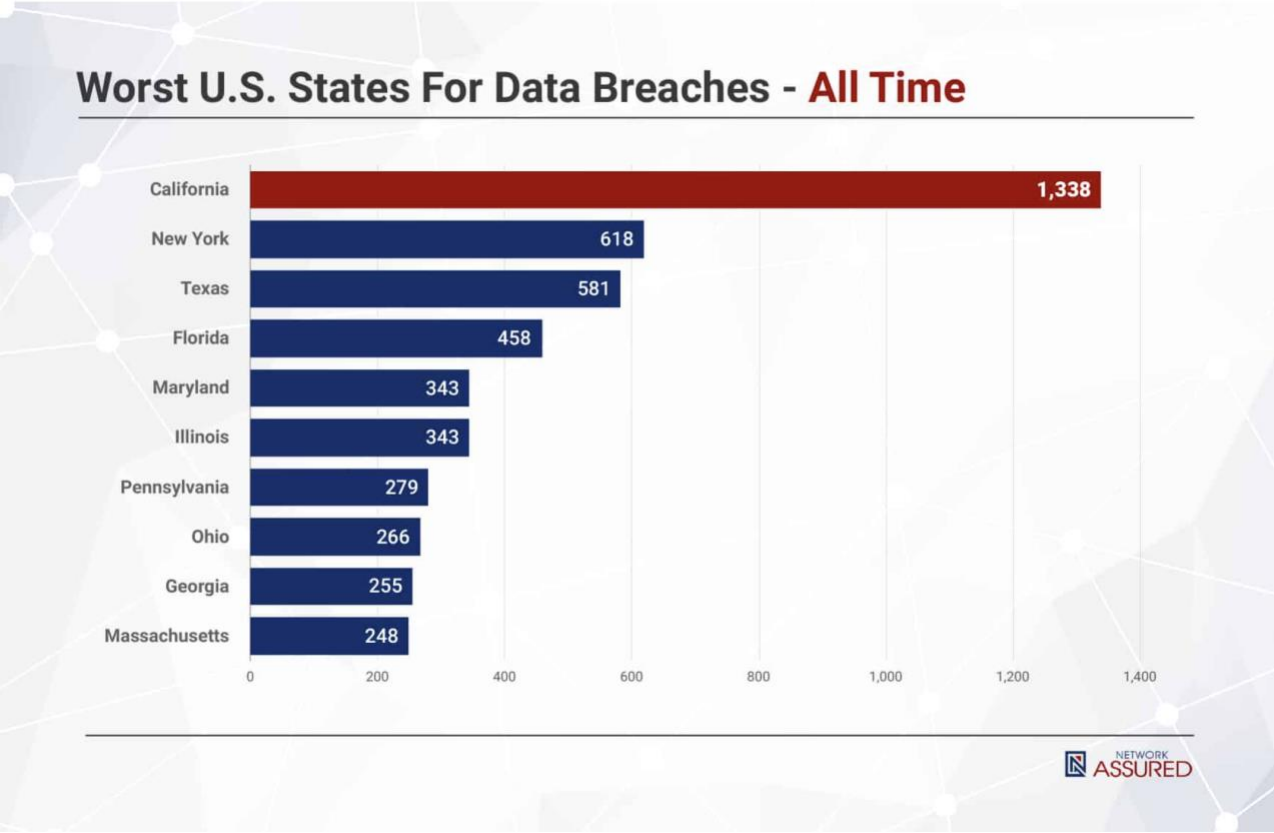
Past Events

According to Statista, in 2022, there were 1,802 cases of data compromises in the United States where 422 million individuals were affected in the same year by data compromises, including data breaches, leakage, and exposure.[72] California was the top of the US states according to the CMS OCR breach list for 2022, experiencing 1,338 breaches.[73] (See Figure 29.) As technology begins to advance and become more prominent, users are increasingly more vulnerable to cyber threats.

[72] Statista, *Annual number of data compromises and individuals impacted in the United States from 2005 to 2022,* August 29, 2023, https://www.statista.com/statistics/273550/data-breaches-recorded-in-the-united-states-by-number-of-breaches-and-records-exposed/ October 16, 2023.

[73] Network Assured, *The 10 Worst States in the U.S. for Data Breaches [Data Study],* February 20, 2023, https://networkassured.com/security/worst-us-states-for-data-breaches/#:~:text=According%20to%20the%20California%20Attorney,in%20healthcare%20and%20human%20services.

Figure 29: Worst U.S States for Data Breaches - All Time



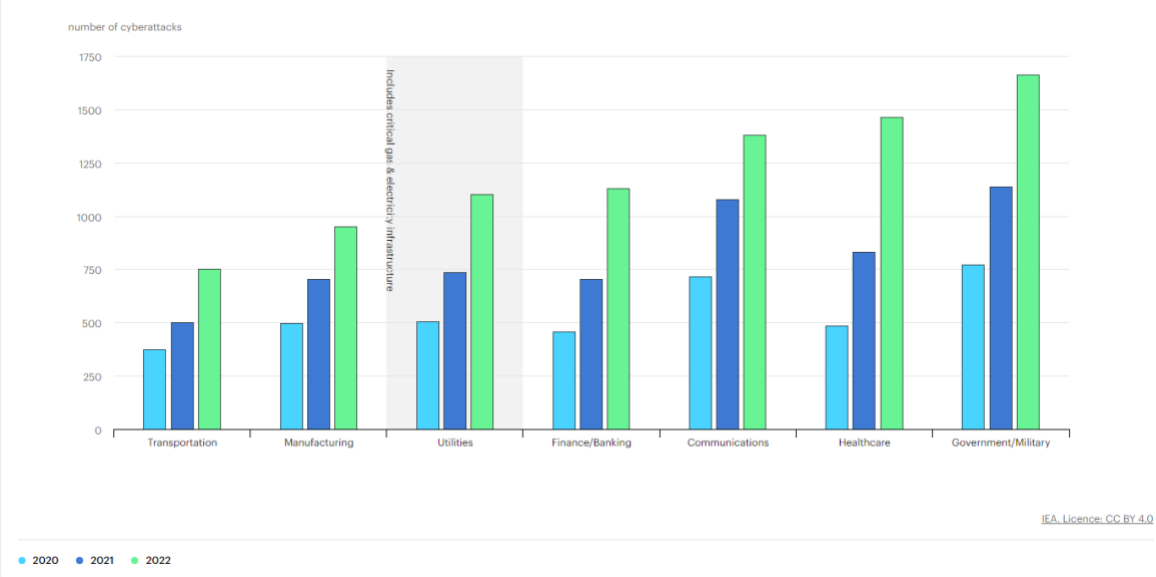
2022 started with Russia's war of aggression on Ukraine which in addition to human toll, threatened order and put many organizations at risk of spillover cyberattacks. At the same time, China state-nexus adversaries increased their cyber espionage campaigns, and Iranian actors launched destructive "lock and leak" operations using ransomware.[74]

Cyberattacks are on the increase in the electricity sector. Cyberattacks on utilities have been growing rapidly since 2018, reaching alarmingly high levels in 2022 following Russia's invasion of Ukraine. More recent attacks in the electricity sector have disabled remote controls for wind farms, disrupted prepaid meters due to unavailable IT systems, and led to recurrent data breaches involving client personally identifiable information. In 2022, the cost of data breach was 4.72 million in the energy sector.[75] Figure 30 below shows the average number of weekly cyberattacks by industry for the period 2020-2022.

[74] Crowd Strike, 2023 Global Threat Report, https://go.crowdstrike.com/rs/281-OBQ-266/images/CrowdStrike2023GlobalThreatReport.pdf, October 10, 2023

[75] Cybersecurity – is the power system lagging behind?, https://www.iea.org/commentaries/cybersecurity-is-the-power-system-lagging-behind, October 10, 2023.

Figure 30: Average Number of Weekly Cyberattacks by Industry for 2020-2022[76]



In May 2021 a ransomware attack on a major petroleum product pipeline's IT network resulted in major prescriptive measures directing U.S. government agencies to take a series of proactive steps to bolster cybersecurity. The International Energy Authority (IEA) is an international energy forum, its responsibilities include tracking and analyzing global key energy trends, promoting sound energy policy, and fostering multinational energy technology cooperation. It states in one of its articles that there is little public information available on significant cybersecurity incidents due to under-reporting and the lack of detection. That being said, there is evidence that cyberattacks on utilities have been growing rapidly since 2018, reaching alarmingly high levels in 2022 following Russia's invasion of Ukraine. They anticipate that this trend will only continue. [77]

17.2.2 Current Mitigation Efforts

SMUD participates in several cross-collaborative cyber threat prevention initiatives (see Table 50).

Table 50: Current Cyber Threat Hazards Mitigation

Mitigation	Description
Mandatory training	SMUD requires completion of the training on cyber security policies, physical access controls, electronic access controls, visitor control program, handling of BCS information and storage, identification of a cyber security incident.
Cybersecurity Incident Response Planning	SMUD maintains a robust Cybersecurity Incident Response Plan that defines the response actions to be taken when a

[76] Cybersecurity – is the power system lagging behind?, https://www.iea.org/commentaries/cybersecurity-is-the-power-system-lagging-behind, October 10, 2023.
[77] International Energy Agency (IEA), Cybersecurity – is the power system lagging behind?, August 2023.

Table 50: Current Cyber Threat Hazards Mitigation	
Mitigation	**Description**
	Cybersecurity Incident occurs. The plan includes several phases and defines various teams to respond to incidents whenever they occur. SMUD exercises its response plan at least twice per year.
Identity access management	Periodic verification of user accounts, user groups, or user role categories and that privileges assigned are correct. Implementation of user account to leased privileged, restricting user accounts to what is needed to do their job.
Privileged Access Management Program (PAM) Project	Installation of hardware and software that prevents people from knowing the passwords to generic or shared accounts. Administrator accounts are managed by the system to prevent users from knowing password.
Physical security plan	Log entry of individuals with authorized physical access to SMUD campus, monitor unauthorized access through physical access points.
System security management	Evaluate security patches, protect against the use of unnecessary physical input/output ports, generate alerts for security events. SMUD has implemented the Cyber Critical Infrastructure Controls required by NERC Standards and the Cyber Security Controls required by the FERC Division of Dam Safety and Inspection standard.
Exercises and testing	Conduct periodic exercises and testing to continuously improve the Cybersecurity Incident Response Plan.

17.3 Physical Threats

Physical security is the protection of personnel, facilities, information, equipment, operations and activities from physical actions and events that could cause serious loss or damage to an enterprise, agency, or institution. This includes protection from fire, flood, natural disasters, burglary, theft, vandalism, and terrorism.[78]

17.3.1 Hazard Profile

Asset Profile and Security Personnel

SMUD has assets spread over a wide geographical area that differ in criticality, type, and vulnerability. The largest set of assets vulnerable to physical attack are our 300+ substations, which vary in size and protection levels applied to mitigate risk or comply with regulatory requirements. SMUD also maintains a turbine farm in the East San Franciso Bay area covering approximately 5000+ acres. There are two large campus-type environments housing the majority of SMUD's workforce personnel and operational assets. SMUD also has a smaller campus east of the Sacramento area that houses both personnel and equipment that operate and maintain SMUD's hydropower assets, consisting of several complexes of dams, powerhouses, and switchyards. The approximate total service territory is 900+ square

[78] https://www.techtarget.com/searchsecurity/definition/physical-security?Offer=abt_pubpro_AI-Insider

miles and approximate total asset footprint (not counting gas pipeline) of 3000 square miles. This vast area is serviced by a full-time internal security force.

Current and Past Incidents
SMUD has experienced a wide range of physical security incidents over the past 5 years. SMUD facilities have been subject to unauthorized intrusions, ballistic attack, theft, burglary, vandalism, and other various petty crimes.

17.3.2 Vulnerability Assessment

SMUD is a publicly owned electric utility that owns and operates infrastructure that delivers reliable power to the public and is part of the U.S. Bulk Electric System. Like many utilities, SMUD's infrastructure, if not underground is above ground or overhead and is generally visible to the public. As such, it makes it an easy target for bad actors to exploit.

SMUD maintains processes and documents to protect the physical security of its properties.

SMUD has established policies to ensure the implementation of its security program that seek to prevent, manage, and mitigate risk of physical incidents. (See Table 51.) This is done by establishing and executing procedures to control access, and to deter, delay, detect, assess, respond to, and investigate incidents.

17.3.3 Current Mitigation Efforts

Table 51: Current Physical Hazards Mitigation[79]

Mitigation	Description
Physical Security Program	SMUD has program documentation which establishes policies, procedures, controls, and guidelines to achieve the security program objectives. The program is reviewed and supported by the Executive team.
Access to SMUD properties	SMUD has developed policies, processes, and procedures to ensure the safety of SMUD Workforce Personnel and the public. The policies, processes, and procedures outline the controls and restrictions to all SMUD Properties, and restricts access based on need as determined by Security Operations.
Employee training, awareness, and behavior	SMUD Workforce Personnel with CIP access receives annual training. SMUD Workforce Personnel and Visitors are required to adhere to all access control policies and procedures. SMUD Workforce Personnel and Visitors should remain aware of others in their vicinity and report any concerns or suspicious activity to Security Operations.
First responder response	During events requiring first responders to respond, SMUD Security Operations will coordinate, facilitate, escort, and assist first responders by following established procedures (i.e., CIP Exceptional Circumstances). During any such

[79] SMUD Physical Security Administrative Policy 2012

Table 51: Current Physical Hazards Mitigation[79]	
	event, SMUD Workforce Personnel and Visitors will comply with and follow all directions issued by first responders on scene.
Mitigation	**Description**
Security assessment and implementation	SMUD continues to assess the security and criticality of its assets and recommends implementation of certain physical security mitigations as appropriate. These mitigations may include additional security cameras, barriers, or intrusion detection systems to name a few.
24/7 security patrols	Compensatory checks and alarm responses occur 24/7. SMUD staffing includes a 24/7 security force responsible for monitoring all closed-circuit television systems, responding to security alarms, and performing security inspections, investigations, etc.
Remote location monitoring	SMUD can monitor assets remotely through Security Operations Centers (SOC) staffed by SMUD as well as contract services.
Physical access management	Fencing, sensors, cameras, and alarms with carefully designed operational procedures and technology applications that remotely monitor facilities and protect critical computerized information resources.

18.0 Other Hazards

18.1 Air Pollution

Air pollution is defined as the air containing any substance that poses harmful or poisonous effects. Air pollution is hazardous to the health of many citizens residing in SMUD's Plan Area. Sources of air pollution are grouped into four major categories: stationary, mobile, area-wide and natural sources.

18.1.1 Hazard Profile

Stationary sources of air pollution include small and large fixed facilities such as power plants, dry cleaners, gasoline stations, and landfills. Mobile sources of pollution include cars, trucks, ships, and airplanes. Area-wide sources of pollution may result from agriculture, consumer products, construction grading or unpaved roads. Natural sources include plant pollens, biological decay, windblown dust, and wildfires. The pollutants from these sources and activities are typically broken up into three major pollutant categories: Criteria (affecting people's respiratory health and/or leading to the creation of ground level Ozone and particulate matter), hazardous (known or suspected to cause cancer and/or other serious health effects), and greenhouse gas (contributing to global warming and climate change).

The American Lung Association's 24th annual air report, *The State of Air*, utilized the most recent criteria air pollution data from the U.S. Environmental Protection Agency and ranked California the most polluted state to live in. The report also ranked the Sacramento-

Roseville region among the 10-topmost polluted cities in the United States.[80] Although air pollution has declined in the past years due to decades of progress on cleaning up sources of air pollution, it continues to be a concern as more than 1 in 3 American live in places with unhealthy levels of air pollution.[81] Table 52 shows the average quantities of emissions in tons per day since 1995. SMUD supports the State's initiatives by reducing air pollutants as detailed in the 2030 Zero Carbon Plan.

Table 52: Statewide Criteria Air Pollutant Emissions (tons/day, annual average)[82]

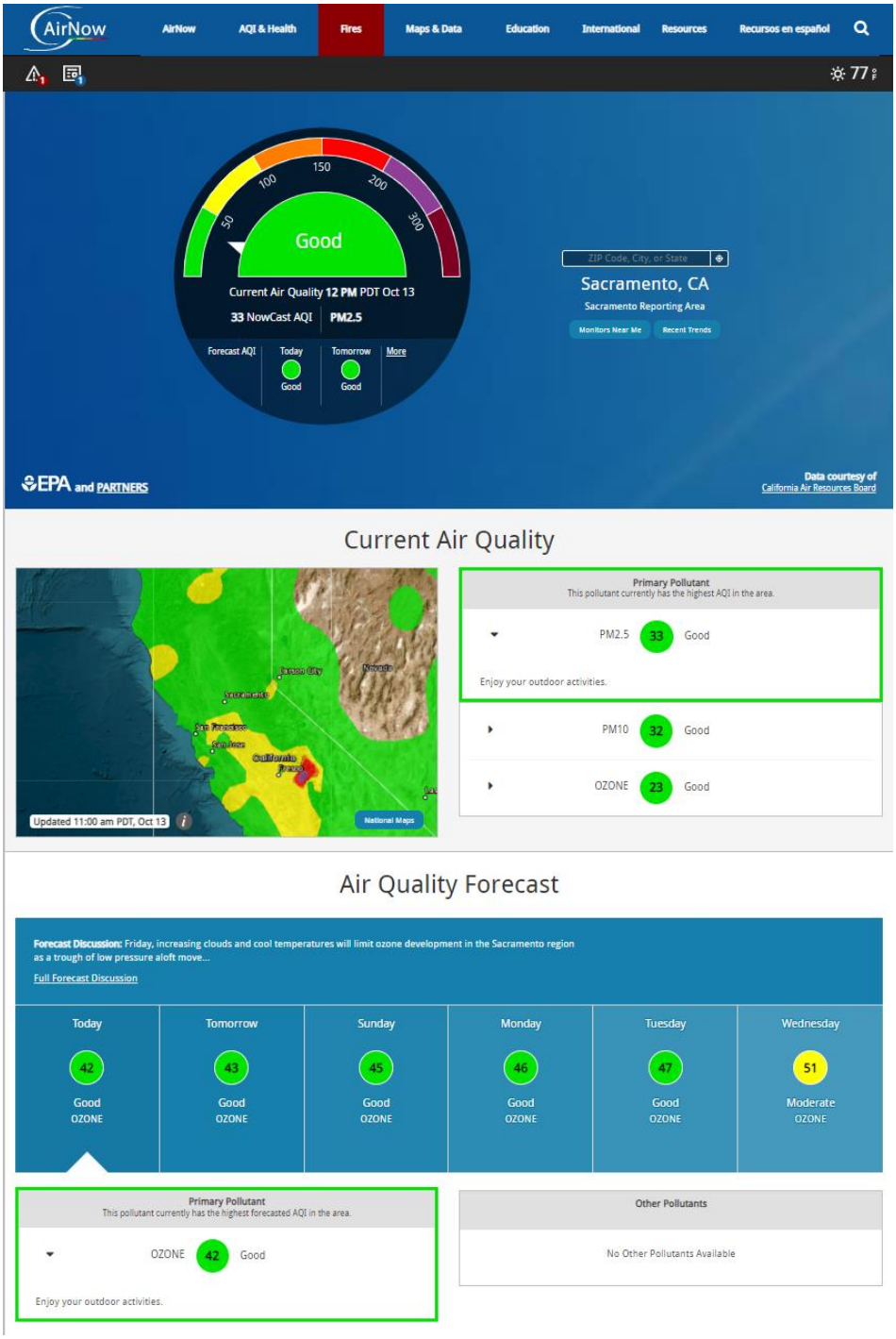
	Actual Emissions						*Projected Emissions*					
Pollutants	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Nitric Oxide (NO_x)	4,319	3,844	3,220	2,741	2,359	2,199	1,163.2	1,145.7	1,099.7	1,047.7	992.6	964.4
Reactive Organic Gas/Volatile Organic Compound (ROG/VOC)	3,761	3,128	2,430	2,167	2,046	2,004	1,470.9	1,465.3	1,469.1	1,469.0	1538.3	1590.9
Particulate Matters 10 micrometers (PM_{10})	2,200	2,267	2,212	2,254	2,326	2,410	1,482.1	1,513.4	1,521.5	1,541.9	1566.7	1593.9
Particulate Matters 25 micrometers (PM_{25})	862	877	864	879	903	933	370.8	374.9	376.8	381.1	386.6	393.1
Carbon Monoxide (CO)	22.8K	17.5K	13.8K	11.4K	9.8K	8.8K	5,139.5	5,124.2	5,154.1	5,244.4	5335.2	5457.2

As a part of its general monitoring process, SMUD leverages a number of different publicly available resources to monitor and forecast air quality within its service territory as well as areas where SMUD employees work. Figures 31 and 32 below are sample maps and data showing in real time, the air quality in the Sacramento area. This data helps air quality agencies forecast and report the "Air Quality Index" (AQI) to the public based on the prevalent pollutants of an applicable weather season. AirNow defines the AQI "*as a yardstick that runs from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 or below represents good air quality, while an AQI value over 300 represents hazardous air quality."* In the summer, the AQI provides ambient levels of ozone and/or particulate, while in the fall and winter seasons, these monitors identify days with high particulate levels. As described

[80] American Lung Association, *Most Polluted Places to Live*, https://www.lung.org/research/sota/key-findings/most-polluted-places, October 12, 2023.
[81] American Lung Association, *State of Air, https://www.lung.org/research/sota/key-findings, October 12, 2023.*
[82] California Air Resource Board Emissions for User Defined Query, https://ww2.arb.ca.gov/applications/emissions-user-defined-query, October 12, 2023.

later, the AQI can help SMUD determine the most appropriate pollutant specific mitigation measures.[83]

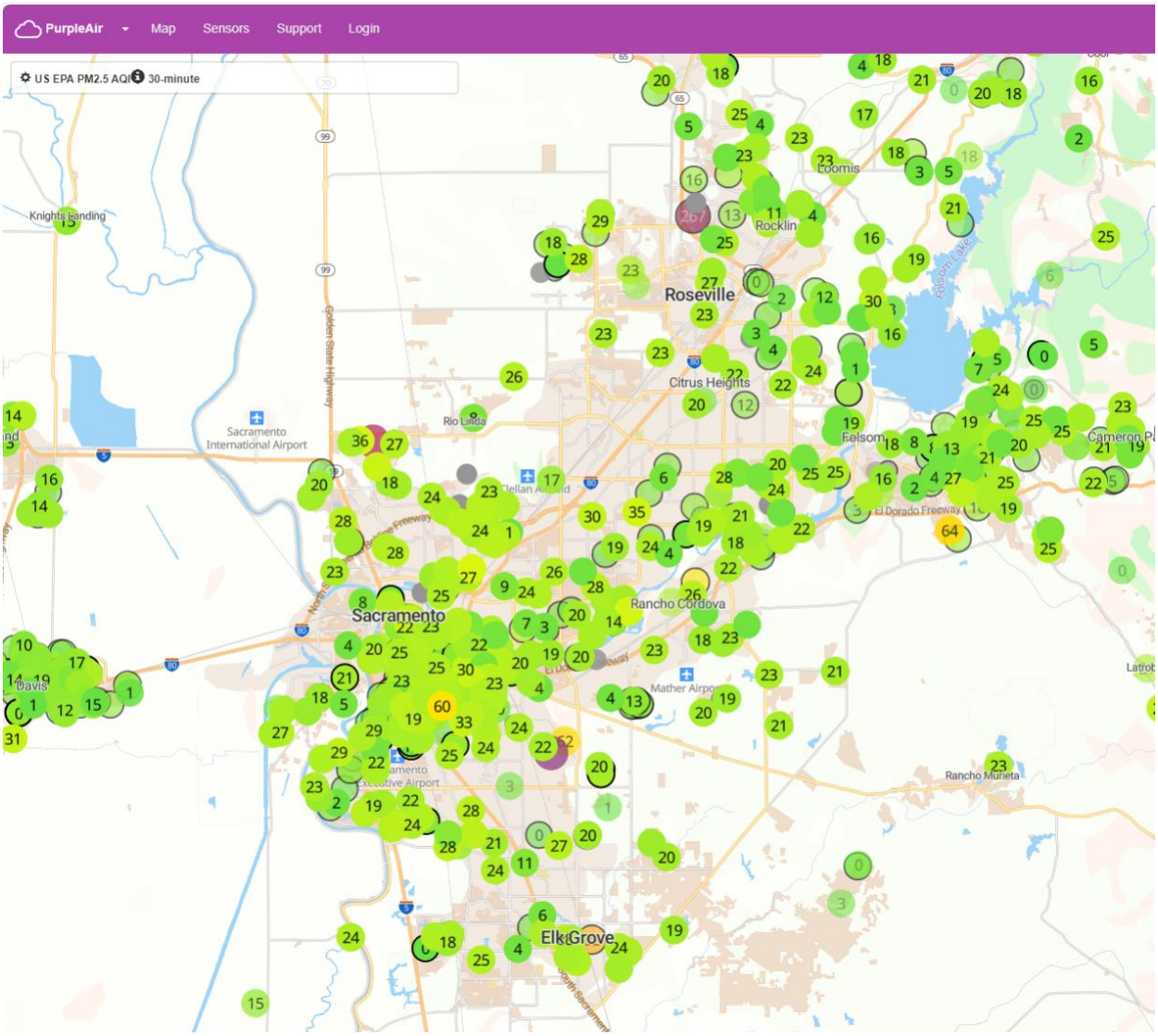
Figure 31: AirNow: Air Quality Sacramento Region[84]



[83] AQI Basics | AirNow.gov

[84] Air Now, Air Quality Sacramento Region, AirNow.gov, October 2023.

Figure 32: Purple Air: Air Quality Sacramento Region[85]



[85] Purple Air, Air Quality Map Sacramento Region, PurpleAir | Real-time Air Quality Monitoring, October 2023.

18.1.2 Current Mitigation Efforts

The table below depicts the mitigations for air pollution hazards.

Table 53: Current Air Pollution Hazards Mitigation	
Mitigation	**Description**
2030 Zero Carbon Plan	SMUD will continue to evaluate its strategy to reduce its own greenhouse emissions while maintaining electrical reliability for its customers. These strategies include the potential reduction of its fossil fuel use among its power plant fleet, retooling its existing equipment to operate on non-fossil fuels, and/or helping the region electrify both its vehicle and buildings.
Air Quality Standards	SMUD will continue to comply with all local, state, and federal air quality rules and regulations as it applies to its affected equipment and operations. SMUD will also continue to partner with local agencies and industry to influence policies and regulations that improve air quality and reduce potential harmful exposure to poor air quality, and wildfire smoke.
Emergency Operations Center (EOC)	The SMUD Emergency Preparedness Duty Officer will monitor daily National Weather Service forecasts for major air quality impacts and will consider proposing activation of the EOC when AQI is equal to or greater than 500 for two consecutive days across a significant area of the service territory. An AQI at or above 500 is considered an immediate hazard to human health.
Worker safety standards	This standard applies to all SMUD employees, performing various job activities, as identified where the Air Quality Index (AQI) for PM2.5 is greater than 150 to provide guidance on protection for employees during wildfire events. An AQI above 150 to 200 is considered unhealthy for some of the general public, with people in sensitive groups experiencing serious health effects.
Building ventilation critical operations	Facilities shall ensure building HVAC filters are inspected and replaced, as needed, during a wildfire events. Facilities will have resources or contracts available to obtain mobile air scrubbers if needed for use at critical infrastructure buildings like the PSO, DSO, Contact Center, Energy Trading, Security Operations.

18.2 Avalanches

An avalanche is weather-related threat that occurs when a mass of snow mixed with ice and debris travels down a mountainside. Avalanches occur in steep mountainous areas of California that receive significant amounts of snow. Avalanches can occur from one or a combination of these components: overloading, temperature, slope angle, snowpack conditions, and vibrations. The most at risk are mountainous areas that have a slope of 25° to 60°.

Avalanches have caused property damage and loss of life in California. Significant events have damaged or destroyed ski resorts at Mt. Shasta and Lake Tahoe. Avalanches have also blocked and damaged roadways. The Plan Area lay amongst the highest regions of Avalanche risk in the State of California. Avalanches can pose a major threat to the communities and SMUD's or WAPA transmission lines, powerhouses, reservoirs, roads, and other infrastructure in the UARP. Secondary impacts may impact SMUD's customers residing outside of the regions susceptible to avalanches.

Because SMUD has not experienced avalanches, there is not sufficient data to describe the extent of damages.

18.3 Drought and Water Shortage

Drought is a gradual phenomenon, occurring slowly over a period of time, caused by a rainfall deficit, and often combined with other predisposing factors. It is difficult to quantify the beginning and ending of a drought. There are four different categories in which a drought can be categorized based on its effects (see table 54).

18.3.1 Hazard Profile

Table 54: Drought Categories

Type	Description
Meteorological drought	Having below average water supply.
Agricultural drought	Overdraft of groundwater to meet the state's crops and agricultural needs because of insufficient water supplies.
Hydrological drought	Lacking surface and subsurface water supplies such as snowpack, streamflow, or lakes.
Socioeconomic drought	Having adverse economic or health impact on a region.

SMUD's Plan Area has a Mediterranean climate. The summers are dry and warm, and the winters are wet and cool. Its proximity to the Pacific Ocean and major mountain ranges defines most of the State's precipitation and runoff. A majority of the water vapor that provides the State's precipitation comes from the ocean. The snowpack in the Cascade Range and the Sierra Nevada contributes to the runoff in the rivers and groundwater

basins. Approximately 75% of the state's annual precipitation occurs between November and March. Many California's droughts stem from an absence, or reduction, of winter precipitation.

Exposure and Vulnerability

California experienced one of the worst droughts in history from 2012 to 2017: 102 million trees died during that time period. This has increased SMUD's vulnerability for tree mortality. In 2014, 100% of the State was experiencing a drought ranked "severe" or worse. During the period of 2012 to 2015, Lake Tahoe warmed 15 times faster than it had historically. The drought became so severe that Governor Jerry Brown instituted a mandatory 25% water restriction in 2015. The drought exacerbated wildfires during those years.

California's most significant historical statewide droughts were 1929-34, 1976-77, 1987-92, 2007-09, 2012-17 and 2020-2022 (see table 55).

Table 55: Historical Droughts in California

Year	Duration (years)	Description
1929-34	6	Occurred when the state's urban and agricultural developments were minimal, therefore the impacts to the economy and community were substantial.
1976-77	2	Brief but severe due to the low amounts of precipitation and runoff.
1987-92	6	Impacted the entire state of California by almost completely depleting the State's major water reserves and projects.
2007-09	3	First ever-statewide proclamation of emergency for drought was issued. Water shortages resulted in economic burdens to agriculture and to rural communities.
2012-17	6	Issued California's second ever-statewide proclamation of emergency for drought. Recorded its lowest annual precipitations in four consecutive years (2012-2015).
2020-22	3	Driest three-year period dating back to 1896, resulting in a state of emergency across California.

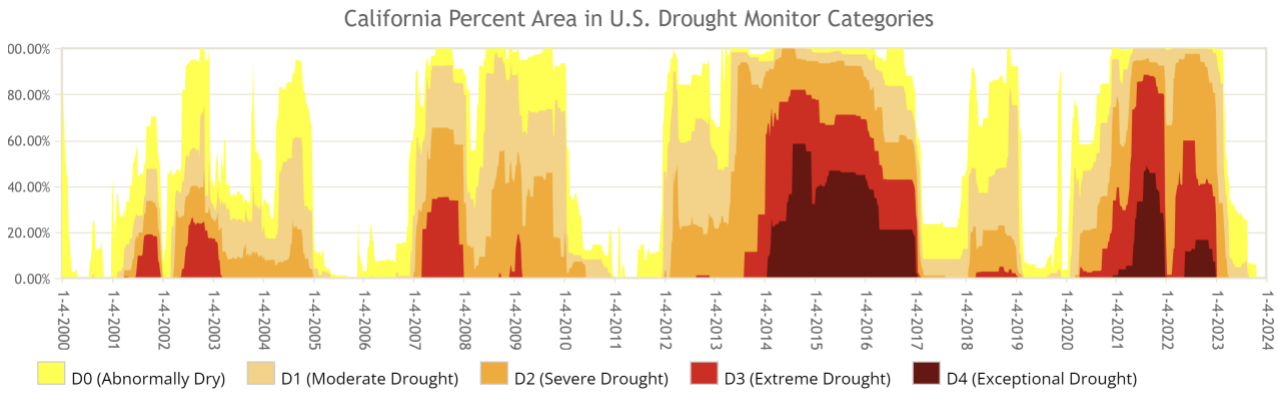
In 2015, at the drought's most severe point, snowpack was estimated to be at 5% of normal levels. The previous lows for snowpack depletion were in 2014 and 1977, each at 25% of normal levels. During a "normal" year, snowpack contributes 30% of California's water needs[86].

Figure 33 below depicts drought intensities from 2000-2023 compiled by the US Drought Monitor. The drought was at its worst for many months beginning in mid-2014 and extending through the end of 2016. In January of 2017, the multi-year drought abruptly

[86] Source: *California Department of Water Resources*

ended with a period of excess rainfall.[87] California returned to drought conditions in 2020, with the drought continuing until 2022.

Figure 33: California Percent Area in U.S. Drought Monitor Categories 2000 to 2023[88]



Drought impacts are felt first by people most dependent on annual rainfall – such as ranchers using dryland range or rural residents relying on wells in low-yield rock formations. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline. The most common secondary effects of drought that are realized by SMUD and occupants in its Plan Area are the environmental impacts such as wildfire hazard, increased tree mortality, the reduced availability of surface water, and the loss of biodiversity in the animal and plant species in the area.

Past Events

The Plan Area has experienced prior drought conditions in recent years with drought periods recorded 2020-2022, 2012-2017, 2007-09, 2000-04, 1987-92, 1975-77 and 1959-61. Table 59 shows the available data found for most recent drought events available in the NCDC database for the Plan Area.

Table 56: Selected List of Drought Events in SMUD Plan Area[89]

County/Zone	Date	County/Zone	Date
Carquinez Strait and Delta	09/01/2015	Carquinez Strait & Delta	06/01/2016
San Joaquin Valley	09/01/2015	Motherlode Camptonville	07/01/2016
Sacramento Valley	09/01/2015	San Joaquin Valley	07/01/2016
Sacramento Valley	10/01/2015	Motherlode Camptonville	08/01/2016
Sacramento Valley	11/01/2015	San Joaquin Valley	08/01/2016

[87] This map shows exceptional drought as D4 in dark red, extreme drought as D3 in red, severe drought as D2 in orange, moderate drought as D1 in light orange and abnormally dry as D0 in yellow.
[88] US Drought Monitor, https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx, October 31, 2023.
[89] Source: NCDC (www.ncdc.noaa.gov) 13 December 2017

Table 56: Selected List of Drought Events in SMUD Plan Area[89]			
County/Zone	**Date**	**County/Zone**	**Date**
Carquinez Strait and Delta	12/01/2015	Motherlode Camptonville	09/01/2016
Sacramento Valley	12/01/2015	San Joaquin Valley	09/01/2016
Sacramento Valley	04/01/2016	Motherlode Camptonville	10/01/2016
Carquinez Strait and Delta	04/01/2016	Sacramento Valley	10/01/2016
Motherlode Camptonville	04/01/2016	San Joaquin Valley	11/01/2016
Sacramento Valley	05/01/2016	Motherlode Camptonville	11/01/2016
Motherlode Camptonville	05/01/2016	San Joaquin Valley	12/01/2016
San Joaquin Valley	05/01/2016	San Joaquin Valley	01/01/2017
Carquinez Strait and Delta	05/01/2016	San Joaquin Valley	02/01/2017
Sacramento Valley	05/01/2016	Motherlode Camptonville	02/01/2017
San Joaquin Valley	06/01/2016	San Joaquin Valley	03/01/2017
Motherlode Camptonville	06/01/2016	Motherlode Camptonville	03/01/2017
Sacramento Valley	06/01/2016	Sacramento Valley	11/01/2021

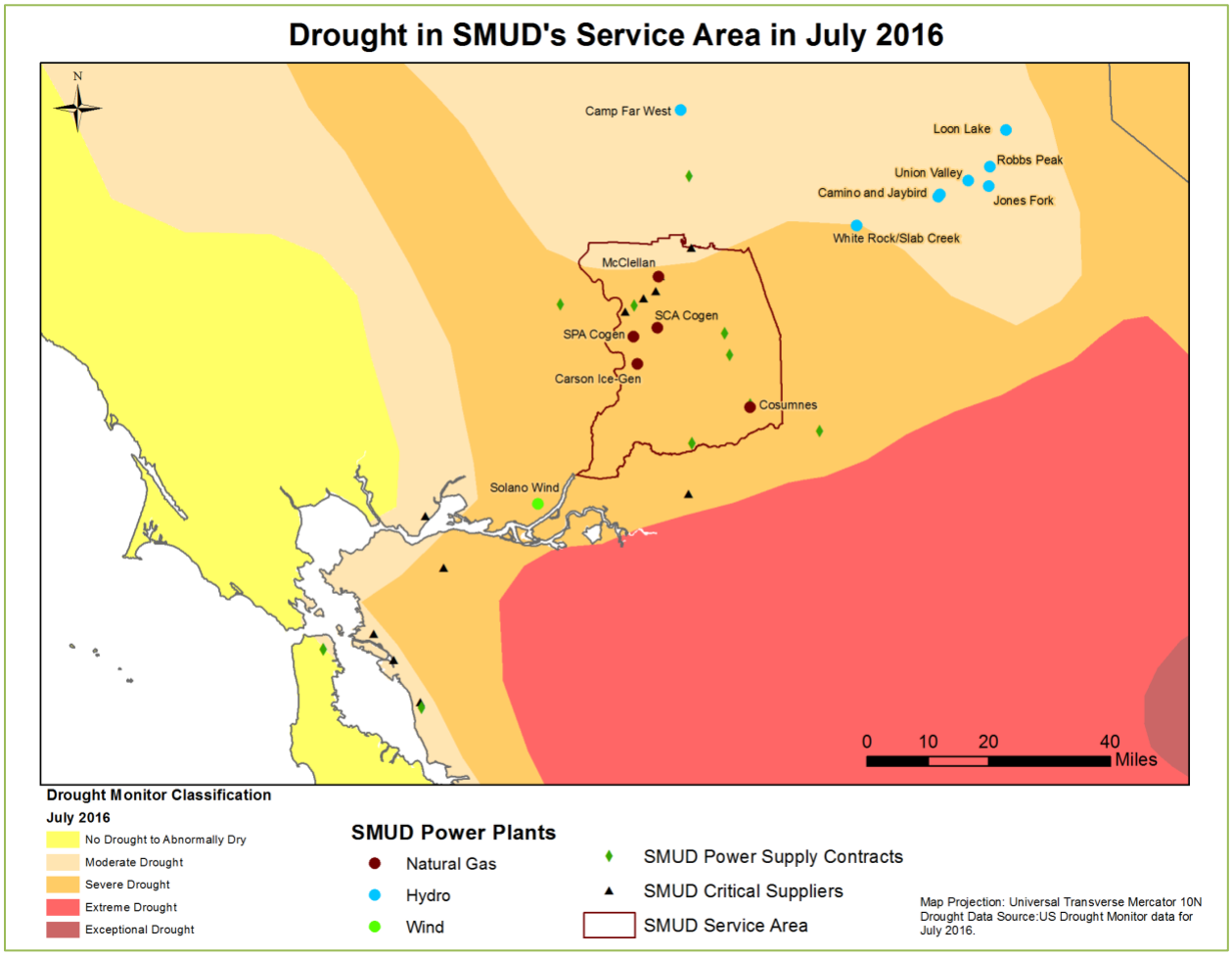
Most detrimental to SMUD's operations and its ability to serve its customers during a drought, is the reduced ability to generate hydroelectric power. A reduction of hydropower generation and water quality deterioration are potential hazards that could affect SMUD during an extended drought period. Droughts have the capacity to affect the following:

- Hydropower: lower water levels impact production capacity in hydroelectric plants
- Biomass: changes in seasonal precipitation patterns can impact vegetation growth, altering the availability of feedstock for biomass generators.

Figure 34 depicts July 2016 drought impacts to the SMUD service area and SMUD power plants as defined by the United States drought monitor.[90]

[90] Drought shapefiles for July 2001-2016 were downloaded from the U.S. Drought Monitor GIS Data Archive. Available at: http://droughtmonitor.unl.edu/MapsAndData/GISData.aspx

Figure 34: SMUD Plan Area Drought Conditions for July 2016 as Classified by the U.S. Drought Monitor



18.3.2 Current Mitigation Efforts

Based on the results of SMUD's Climate Readiness Action Plan assessment, SMUD continues to monitor how drought impacts energy generation and commodity costs. SMUD has several initiatives that reduce the risk of water shortages in drought conditions, including the hydro rate stabilization fund that accrues money to purchase replacement power in years with lost hydropower generation. Additionally, SMUD is in cooperation of the SPA with the Sacramento Regional County Sanitation District (Regional San) to deliver recycled water from Regional San treatment facilities to be used for cooling and fire protection at the SPA power plant. The table below depicts mitigation efforts for drought hazards.

Table 57: Current Drought Hazards Mitigation	
Mitigation	**Description**
Rate stabilization fund	SMUD has funds set aside to help maintain electric rates for SMUD customers in times of extreme dry weather.
Evaluations	Consider various evaluation options to hedge low rain fall.
Measurements	SMUD's hydro staff conduct snow surveys and measure water elevations and flows periodically to be utilized by SMUD's Energy Trading and Contractors staff in managing the water storage resource as efficiently as possible throughout the year.
Alternative storage	Pump storage project Junction Reservoir to Union Valley ~50MW.
Water conservation	SMUD complies with water conservation efforts by the State of California.
Drought resistant landscaping	SMUD has replaced its landscaping with drought resistant landscaping and will continue to do so where appropriate.

18.4 Hazardous Material Release

Hazardous materials have properties that make them potentially dangerous and harmful both to human health and the environment. The Department of Toxic Substances Control (DTSC) regulates hazardous materials in California. DTSC defines hazardous materials as materials with properties that make it potentially dangerous or harmful to human health or the environment. The universe of hazardous materials is large and diverse. Hazardous materials can be liquids, solids, or contained gases.[91]

18.4.1 Hazard Profile

An accidental hazardous material release can occur wherever hazardous materials are manufactured, stored, transported, or used. There could also be incidents of intentional hazardous release either from terrorist or provocateur activities. Depending on the material involved, the release may affect nearby population and/or contaminate critical or sensitive environmental areas within the Plan Area.

The release of hazardous materials to the environment could damage the environment, property, or human health. The extent of damages is dependent on the type, location, quantity, concentration, physical, chemical and/or infectiousness of the material released. Although hazardous material incidents can happen almost anywhere, certain areas of the state are at higher risk. These include areas: near roadways (frequently used for transporting hazardous materials), adjacent to industrial facilities (that use, store, or dispose hazardous materials), and crossed by certain railways, waterways, airways, and pipelines (that transport hazardous materials).

Releases of explosive and highly flammable materials have been known to cause fatalities and injuries, necessitate large-scale evacuations, and destroy millions of dollars' worth of

[91] https://dtsc.ca.gov/, Defining hazardous waste, https://dtsc.ca.gov/wp-content/uploads/sites/31/2015/05/DefiningHazardousWaste.pdf

property. Toxic chemicals in gaseous form have been known to cause injuries and fatalities among emergency response teams and passersby. Serious health effects have been known to result when toxic materials enter surface or ground water-supplies. Releases of hazardous chemicals have been especially damaging when they have occurred in highly populated areas or along heavily traveled transportation routes.

18.4.2 Exposure and Vulnerability

SMUD's Plan Area is a mix of urban, suburban, and rural areas. Military and former military installations located in SMUD's Plan Area must be considered as potential sources for hazardous material releases. When a hazardous material emergency occurs, multiple resources are available with the local fire departments typically leading response activities. SMUD's Plan Area contains major transportation arteries, such as interstates, highways, railroads, and airports, each facilitating the transport of hundreds of thousands of tons of hazardous materials through and into SMUD's Plan Area each year. SMUD is highly exposed to the effects of a major catastrophic hazardous material emergency due to the proximity of the transportation routes to densely populated areas. Additionally, SMUD must be concerned with the Port of West Sacramento and the various bulk gasoline terminals located along the Yolo County side of the Sacramento River front because prevailing winds come from the southwest. Considerations must be made also for the numerous agriculturally related businesses located within the response/mutual aid area.

SMUD's Plan Area contains major oil and gasoline terminals, drinking and wastewater pumping facilities, and numerous large diameter underground pipelines. Agriculture uses large quantities of pesticides and chemicals that are stored at numerous sites. Fixed facilities are limited to small industrial parks within or near the incorporated cities. Air transportation of hazardous materials involves the smallest quantities but still poses a potential hazard.

There are also numerous underground and aboveground storage tank facilities for flammable liquids throughout SMUD's Plan Area.

18.4.3 Current Mitigation Efforts

SMUD owns and/or operates several potential sources of hazardous materials releases. SMUD follows all federal, state, and local regulations relating to the use, storage, and disposal of hazardous materials. All hazardous material Safety Data Sheets specific to an asset or location are kept on site and also available online. Field and support staffs are trained to respond to leaks, spills, and discharges. All SMUD facilities above regulatory mandated quantity thresholds operate under Hazardous Materials Business Plans (HMBPs) prepared by the Environmental Services Department. These plans are updated annually and certified as accurate with the applicable local governing agency.

18.5 Oil Spill

18.5.1 Hazard Profile

An oil spill is a release of liquid petroleum into the environment due to human activity or technological error that results in the pollution of land, water, or air. Oil spills can also

occur naturally through oil seeps on land or underwater. Depending on the size, origin, and duration of the release, an oil spill can have serious impacts on water quality, public health, plant and animal habit, and biological resources. The cleaning and remediation of large spills can cost millions of dollars and the environmental and social impacts can last for many years. Common causes of oil spills include human-caused mistakes, equipment malfunctions or failure, natural disasters, terrorist acts, and/or illegal dumping.

18.5.2 Exposure and Vulnerability

Some of SMUD's electric and mechanical equipment utilize oils to operate. This equipment and affected facilities are located on land near stormwater systems and waterways. However, SMUD is at very low risk for the likelihood of an oil spill event because of existing mitigations (see table 61: Current Hazardous Materials and Oil Spill Hazards Mitigation).

SMUD's Plan Area is land-locked and is not susceptible to underwater seeps or disasters related to offshore oil drilling. The most likely oil spill hazards threatening SMUD's Plan Area is the release of oil from either third-party vehicle accidents (involving SMUD's oil-containing equipment) or the malfunction/failure of the oil-containing equipment.

Today, our five natural gas plants provide low-cost, reliable power 24/7. Eliminating greenhouse gas emissions from our power plants is essential to reach our zero-carbon goal by 2030. We're focused on reimagining our existing generation portfolio to eliminate greenhouse gas emissions through replacement, re-tooling and using renewable fuels. To drastically reduce SMUD's fossil fuel related greenhouse gas emissions, we currently plan to adjust the utilization of the generation fleet by placing at least 2 power plants while exploring retrofit technologies such as alternative fuels and/or post-combustion controls. Maintaining reliable electric service is critical, so we will conduct more detailed reliability assessments before finalizing plans for our natural gas power plants.

We will expand the use of our existing carbon-free energy technologies like wind, solar, hydro, biomass, geothermal energy, battery storage and demand response. While these proven carbon-free technologies aren't fully capable of achieving our 2030 zero carbon goal, they can help get us about 90% of the way there. Today, SMUD's power supply is about 50% carbon-free. Our plan includes adding ~3,000 Megawatts of new renewable energy and storage, which is equivalent to the energy needs of more than 600,000 homes per year. This includes growing rooftop and battery storage adoption.

We will explore new and emerging technologies—like power-to-gas technology, hydrogen and methane, long-duration batteries, and carbon sequestration—that are either currently unknown or are not ready for large scale adoption due to price, reliability or other factors. This work will help us identify potential partnerships and business models like virtual power plants, and launch pilot projects and programs to test and prove new and emerging technologies and develop paths for prioritizing technology adoption and scaling.

Our road map to zero carbon identifies cost ranges and rate impacts associated with expanding our existing proven clean technologies and for researching and piloting new technologies and business models. We're focused on making sure achieving our zero-

carbon goal is possible at a reasonable cost that minimizes rate increases for our customers, limiting rate impacts to the annual rate of inflation. We'll do that by identifying savings and pursuing partnerships and grants that support the Zero Carbon Plan.

18.5.3 Current Mitigation Efforts

The table below depicts the mitigation activities for hazardous materials and oil spills.

Table 58: Current Hazardous Materials and Oil Spill Hazards Mitigation

Mitigation	Description
Spill Prevention Control and Counter Measure (SPCC) Program	The SPCC program provides mitigation control to prevent discharges of oil, and properly respond to discharges of oil, if it does occur. Facilities with equipment over mandated storage volumes (either individually or cumulatively) are part of a SPCC plan. The plan outlines equipment requirements and engineering controls, inspection criteria and frequencies, recordkeeping, and reporting requirements. For example, Appendix B of SMUD's Substation Specific SPCC Plan contains the "Substation Maintenance Oil Spill Cleanup for SMUD Substation Facilities" and the "Environmental Services Oil Spill Response for SMUD Substation Facilities" procedures. These oil spill cleanup and contingency procedures contain guidelines for performing the necessary oil spill cleanup, notifications, and reporting. The Substation Maintenance procedure identifies the actions that shall be taken by Substation Maintenance personnel upon discovering and responding to an oil spill. The Environmental Services procedure identifies the actions that shall be performed by HazMat Services and Environmental Services personnel when responding to an oil spill at a SMUD substation facility. These procedures were written to ensure that any oil spill at a substation facility is cleaned up as expeditiously as possible in an environmentally responsible manner. In addition to the information included in the above procedures, the SPCC plans also outline that SMUD maintains: 1) HazMat Services, Substation Maintenance, and Environmental Services personnel on-call at all times to ensure that an oil spill is cleaned up as soon as reasonably possible; 2) an Emergency Contact List which lists local, state, and federal regulatory agencies as well as key SMUD personnel; 3) guidelines for performing the necessary oil spill notifications and reporting requirements.

Table 58: Current Hazardous Materials and Oil Spill Hazards Mitigation	
Mitigation	**Description**
Hazardous Material Business Plan (HMBP)	The HMBP program is overseen by the local Certified Unified Program Agency (CUPA) (e.g., a local agency certified by the California Environmental Protection Agency to implement and enforce State hazardous waste and hazardous materials regulatory management programs). The HMBP provides an inventory of materials and outlines mitigation controls to prevent or minimize harm to public health, safety, the environment, from a release of a hazardous material. A HMBP is required when hazardous materials are present above certain threshold quantities at a site. The plan contains detailed information about the hazardous materials stored onsite, including but not limited to 1) inventory volumes and/or weights; 2) detailed site map(s) and applicable material storage and handling location(s); 3) important SDS details and signage; 4) site specific emergency response plans; and 5) personnel training requirements and frequencies; and 6) recordkeeping and reporting requirements. As such, the plan is also shared via an online database with local agencies and first responders. This helps ensure that outside agencies understand the hazardous present at an applicable site.
HMBP Emergency Response Plan	The Emergency Response Plan is a subset of the HMBP. It is site specific and details the procedures in the event of a release (or threatened release of a hazardous material), including, but not limited to:1) immediate notification contacts to the appropriate local emergency response personnel and to the CUPA; 2) mitigation of a release (or threatened release) for each hazardous material to minimize any potential harm or damage to persons, property, or the environment; and 3) evacuation plans and procedures.
Training	SMUD's personnel is trained to handle and report hazardous material and oil spills in the same general manner for facilities storing hazardous materials in quantities below SPCC and/or HMBP applicability thresholds.
Engineering Controls and Best Management Practices	SMUD uses a mixture of engineering controls and best management practices (BMPs) to design and operate the facilities and their respective equipment in a manner that reduces the likelihood of a spill or release. Engineering controls include emergency sumps large enough to capture spilled oil within a facility, visual and/or audible alarms to manage storage tank volumes and prevent storage tank overfill, and "oil minder pumps" that prevent the pumping of oil impacted water out of catch basins. BMPs include establishing equipment inspection frequencies, using standard inspection forms, installation of additional signage, and training specific to a site or asset.

Table 58: Current Hazardous Materials and Oil Spill Hazards Mitigation	
Mitigation	**Description**
Contractor and Vendor Support	SMUD maintains contracts with qualified emergency response environmental contractors and waste vendors. These vendors ensure that SMUD can mitigate releases, remediate an affected site to its original pre-spill condition, and ensure that hazardous materials are handled, transported, and disposed of in accordance with all state and federal requirements.

18.6 Natural Gas Pipeline Hazards

18.6.1 Hazard Profile

SMUD owns and operates 76 linear miles of natural gas pipelines. Natural gas from these pipelines is required to operate SMUD's thermal power plants and to help SMUD meet its load serving capability. SMUD's pipelines are in and near communities where people work and live. In operating the pipelines, safety is SMUD's top priority. SMUD is committed in protecting the people, environment, and communities along these pipelines.

18.6.2 Exposure and Vulnerability

SMUD's gas pipelines are fewer and newer as compared with other utilities. However, in the event of a gas pipeline breach, impacts could result in total loss of assets and damage to surrounds up to and including loss of life.

Increasing population growth in urban areas is resulting in a greater number of people living and working closer to existing gas transmission pipelines. The aging of SMUD's gas transmission system also slightly increases the risk of potential disaster. Causes of and contributors to pipeline failures include third party damage, construction defects, material defects, internal and external corrosion, operational errors, control system malfunctions, outside force damage, subsidence, and seismicity.

18.6.3 Current Mitigation Efforts

The Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) is the primary safety regulator of the pipeline system. Its regulations and safety standards address a variety of issues affecting pipeline safety, including pipe and component manufacture, how pipelines are built, operated, maintained, and inspected, how personnel are trained, and how companies respond to emergencies.

SMUD meets and exceeds all regulatory requirements through SMUD Gas Pipeline Operations integrity management program which includes, detective controls through line patrols and leak detection systems, process controls, participation in the USA North 811 system (call before you dig) and engineering controls such as remote operating valves with LineBreak systems to respond to gas leaks. These controls are implemented to ensure public safety and prevent compromise to SMUD's gas transmission systems.

SMUD is a member of USA North, which provides a free damage prevention service to protect citizens, the community, the environment, essential public services, and underground facilities in Central and Northern California and all of Nevada. USA North

notifies SMUD of any excavation that may occur on or near our buried infrastructure. SMUD's participation in this organization helps to reduce the risk of damage to SMUD's infrastructure and increases public safety.

SMUD is also a member of the California Regional Common Ground Alliance (CARCGA) which is a body that establishes industry best practices and is comprised of underground utility operators and excavation companies. CARCGA also serves as an advisory committee to the California Dig Safe Board which is the state entity responsible for revising and adopting state excavation law. The table below depicts mitigation activities for radiological hazards mitigation.

Table 59: Current Radiological Hazards Mitigation

Mitigation	Description
811 USA process	Protects the community and SMUD's high priority sub surface installation.
Integrity Management Program	Encompasses all maintenance activities on the gas pipeline to ensure the integrity of the pipelines. This is done through periodic inspections, including internal line inspections, monitoring cathodic protection, and periodically exposing gas pipelines for direct assessment. Includes public awareness program which informs people that there are underground utilities and that they need to contact 811 prior to digging.
Regulatory oversight	Various entities have oversight over the safe operations of SMUD's gas pipeline systems including DOT PHMSA, CEC, and State Dig Safe Board.
Operator Qualification Program	All Gas transmission operators are required to have an operator qualification program under 49 CFR 192 to ensure that all persons who perform maintenance activities on natural gas transmission lines meet the qualification requirements of 49 CFR 192.
Exercises	Periodic emergency exercises to test emergency action plans and make updates and changes where appropriate.
Emergency Action Plan	The plan outlines the emergency response to any incident on the gas pipeline.
Agency coordination and collaboration	Participate in various organizations to share best practices and latest technologies in gas pipeline operations and maintenance. Collaborate with neighboring utilities regarding public awareness and damage prevention.
Mutual Aid Agreement	Agreement for either entity upon need or request to provide assistance in responding to emergency events involving the gas pipeline.
Flood mitigation	Install flood mitigation measures to protect gas pipeline assets from impacts of future flood events.

Table 59: Current Radiological Hazards Mitigation	
Mitigation	**Description**
Real-time monitoring	Obtaining software to monitor various factors that have the potential to increase pipeline risks e.g., news outlets, public unrest, etc. Will include SMUD data to monitor pipeline integrity.
Quantitative risk assessments	Leveraging artificial intelligence to enhance SMUD's integrity management activities which may lead to potential future projects.

18.7 Nuclear Hazards

Nuclear hazard is referred to as the risk or danger to any living species or environment posed by radiation emanating from the atomic nuclei of a given substance.

18.7.1 Hazard Profile

There are no natural nuclear hazards in the Plan Area. There is a very low probability of accidental exposure of solid material managed by local businesses, including SMUD. Close up, unprotected exposure to radioactive materials can have negative long term health effects.

18.7.2 Exposure and Vulnerability

SMUD owns the decommissioned Rancho Seco Nuclear Generating Station. Spent fuel is stored onsite in the Independent Spent Fuel Storage Installation (ISFSI) awaiting the DOE direction to move it to an appropriate facility. Rancho Seco is in Sacramento County, 25 miles southeast of the City of Sacramento and 26 miles northeast of the City of Stockton, the two largest cities within a 50-mile radius of the site. The site occupies approximately 14 of the 2480 SMUD-owned acres at the Rancho Seco site, which is flat to rolling terrain. The nearest population center of 25,000 or more is the City of Galt, which is about 10 miles northwest of the site. State Route 104 runs north of the site in an east-west direction. Route 104 connects with U.S. Route 99 and Interstate 5 to the west and State Routes 88 and 12 to the east.

The area near Rancho Seco is sparsely populated and is used primarily as grazing land and grape vineyards. The only public use facility within a 5-mile radius of the site is the Rancho Seco Reservoir and Recreation Area, which is located approximately 1 mile southeast of the site and is within the land owned by SMUD. There is no indication of geological faulting at the site.

The risk that radiation exposure because of long-term storage of nuclear spent fuel at Rancho Seco may result in environmental, health and safety risks is extremely low. Incidents that lead to a breach of spent fuel canister integrity are unlikely to occur.

The ISFSI Safety Analysis Report (SAR) discusses the design criteria and accident analysis criteria for the spent fuel storage system. It identifies potential incidents such as fires associated with combustible materials, loss of contamination control, natural phenomena, and external human caused events such as terrorism. The ISFSI SAR provides an analysis of

the following incidents: human caused events, earthquake, fire, tornado, flood, lightning, and snow loads. The result of these analysis state that there are no credible events that would result in the exposure of the public, outside of the ISFSI licensed area, above the limits stated in the regulation.

18.7.3 Current Mitigation Efforts

The table below depicts mitigation actions for radiological hazards.

Table 60: Current Radiological Hazards Mitigation

Mitigation	Description
Rancho Seco site-specific Emergency Plan approved by the Nuclear Regulatory Commission	In the event of an emergency occurring at Rancho Seco, the site-specific Emergency Plan will be implemented. Response includes activating emergency response facilities; making formal notifications to SMUD's management, Nuclear Regulatory Commission, and Sacramento County Office of Emergency Operations; response and recovery activities.
Exercises	Every 2 years, SMUD leads an exercise with outside agencies to verify adequacy of the emergency plan and develop action plans to correct any identified variances as appropriate. Annually conduct on-site drills required by the emergency plan to evaluate training and implementation as well as identify potential deficiencies to correct via action plan.
Physical barriers and monitoring	Fence surrounds emergency planning zone with controlled access and various monitoring devices.
Law and regulations	SMUD continues to follow and apply rules and regulations under 10 C.F.R. §72.32 and any future updates as required.
State and Sacramento County Offices of Emergency Services	Periodic meetings to update agencies on emergency plan changes, share emergency response telephone directory (ERTD), and conduct semi-annual communication testing.
Radiation monitoring	Continuous monitoring of radiation badges quarterly.
Site specific physical security plan approved by the Nuclear Regulatory Commission	Site specific plan outlining specific physical security requirements and actions.
Monitoring Federal actions	SMUD is monitoring Federal actions for moving spent nuclear fuel.

18.8 Bird Strike

Bird strikes are defined as avian/ power line interactions including electrocutions, collisions and nesting, avian/ wind turbine collisions and avian/ aircraft interactions.

18.8.1 Exposure and Vulnerability

SMUD owns and operates several wind turbine facilities located in Solano County. Collisions between wildlife and turbines often occur, causing detriment to the wildlife as well as damages to SMUD facilities. In addition to damages, collisions between wildlife and

infrastructure can also create a threat of power disruption. SMUD's infrastructure traverses the Pacific flyway for migratory birds. SMUD operates aircraft around the service area and UARP, which are also at risk from bird strikes. For SMUD, the most common bird strikes occur between birds and its overhead power lines which result in approximately 150 bird-focused outages per year. In addition, when there are bird collisions, 2-3 birds per year may get electrocuted and have the potential to start a grass fire. Grass fires are usually small and easy to control.

18.8.2 Current Mitigation Efforts

Basic mitigation strategies for bird strike are broken into three strategies: Increase resistance to bird strike, remove birds from an area, or move the infrastructure away from the birds (see Table 61).

Table 61: Current Bird Strike Hazards Mitigation

Mitigation	Description
Design	SMUD has an Avian Protection Plan which requires SMUD to implement mortality reduce measures in response to bird-caused outages and the use of avian safe standards where it's required to maximize phase separation and phase-to-ground clearance to minimize the risk of electrocution or to prevent perching where sufficient clearances cannot be achieved.
Wildlife management	Taking lethal and non-lethal measures to remove wildlife habitats and potential food sources from crucial infrastructure such as wind turbines.
Operations	SMUD has a bird and bat protection plan and an eagle take permit for the Solano Wind project which requires mitigation measures to be implemented when bird mortalities including eagle occur including curtailment of wind turbines to minimize bird mortality.
Relocation	If infrastructure is prone to bird strike, an investment might be made to relocate assets to reduce the likelihood of a hazardous event.

18.9 Pandemic

18.9.1 Hazard Profile

The World Health Organization defines a pandemic as an epidemic occurring over a wide area, usually affecting a large number of people. Pandemics typically occur when a new virus appears, toward which the human population has not built immunity. Historically, SMUD's Plan Area has seen the influenza pandemics of 1918, 1957, and 1968, the Swine Flu pandemic, and most recently the COVID-19 pandemic[92].

18.9.2 Assessment of Vulnerability

Pandemics are unpredictable and have the potential to adversely impact SMUD's operations. SMUD's aptness to predict and meet load demand is challenged heavily during a pandemic. Load demands may be hampered by consumers reacting to social distance

[92] Source: Sacramento County Hazard Mitigation Plan

mandates and business and school closures. Pandemic-induced business closures may impact SMUD's supply chain, affecting SMUD's ability to procure supplies to meet new capacity demands and maintenance needs. Additionally, legislation[93] that aims to mitigate the economic hardship that a pandemic brings may hinder SMUD's ability to collect payment from customers, further constraining SMUD's operations. The assessment of vulnerability here is focused on moderate pandemic events which are more likely events to occur. However, in the event that more severe pandemic event was to take place, the impact could potentially be catastrophic.

18.9.3 Current Mitigation Efforts

By necessity of the COVID-19 pandemic, SMUD developed extensive pandemic mitigations (see Table 62). SMUD continued reliably delivering power to customers by utilizing the Emergency Operations Center, coordinating with local and state emergency management structures, and utilizing internal workforce health protections.

Table 62: Current Pandemic Hazards Mitigation

Mitigation	Description
EOC	Provides real-time coordination, incident command, response and recovery from emergencies, hazards, and catastrophes.
Regional response coordination	SMUD actively participates in city, county, and state emergency management structures for assuring coordinated responses to emergencies and disasters such as pandemics.
Workforce health protections	SMUD reserves the right to allow employees to work offsite, offer employees vaccinations, and instituting effective employee quarantines as appropriate.
Grace period for customer payments	SMUD has the option to provide a grace period and flexible payments plans for the payment of utility bills and refrain from pursuing collection remedies for unpaid bills for a period of time.
No shut-off policy	SMUD reserves the right to not disconnect power to a customer for non-payment of its electrical bill under certain conditions.
Increase filtration and clean air	Pilot Project, ionized air filtration for critical spaces.

18.10 Supply Chain Hazards

18.10.1 Hazard Profile

Many disruptors are driving supply chain gridlock and impacting end-to-end operations. Pre-pandemic supply chain vulnerability as a result of geographic concentration continue to be compounded by the effects of the pandemic and increased geopolitical tensions. As such, supply chain disruptions have affected operations across most industries, including

[93]Source: *Washington Post* https://www.washingtonpost.com/politics/2021/01/25/energy-202-biden-under-pressure-stop-utility-shutoffs-during-pandemic/

the electric power sector. Unavailable materials, project delays, inflation, eroded capital budgets, prolonged labor shortages and strained operations are a few of the potential drivers of supply chain risk.

18.10.2 Assessment of Vulnerability

A number of factors make it challenging for SMUD's supply chains to operate efficiently and at full value. Material shortage and scarcity of crucial items, such as electric steel, electronic components, and cable, are disrupting supply. SMUD has been impacted by the lack of available transformers, many of which are manufactured overseas. Delivery times in many cases more than doubled, taking years to procure certain critical equipment such as transformers. These challenges continue to be exacerbated by the rise of geopolitical tensions. A recent Kearny article sited that "suppliers recognize the gap between demand and their supply of transformers, but even if they can increase production or bring it onshore, new facilities take time to build. Many shortages show no sign of letting up, with manufacturers struggling to fill orders during emergencies or canceling them altogether"[94]. Figure 35 is a chart resulting from Kearny's client interviews.

In addition, supply chain shortages increase demand and prices continue to rise. Figure 35 shows the change in price for transformer cost showing largely unchanged prices through 2020 and a rise in 134 percent since then. The Kearny study noted a similar trend for electric wires and cable costs.

[94] Kearny, *Supply chain resilience can propel the power sector through the energy transition – and please investors in the process*, June 28, 2023, https://www.kearney.com/industry/energy/article/-/insights/supply-chain-resilience-can-propel-the-power-sector-through-the-energy-transition.

Figure 35: Equipment Lead Time Changes[95]

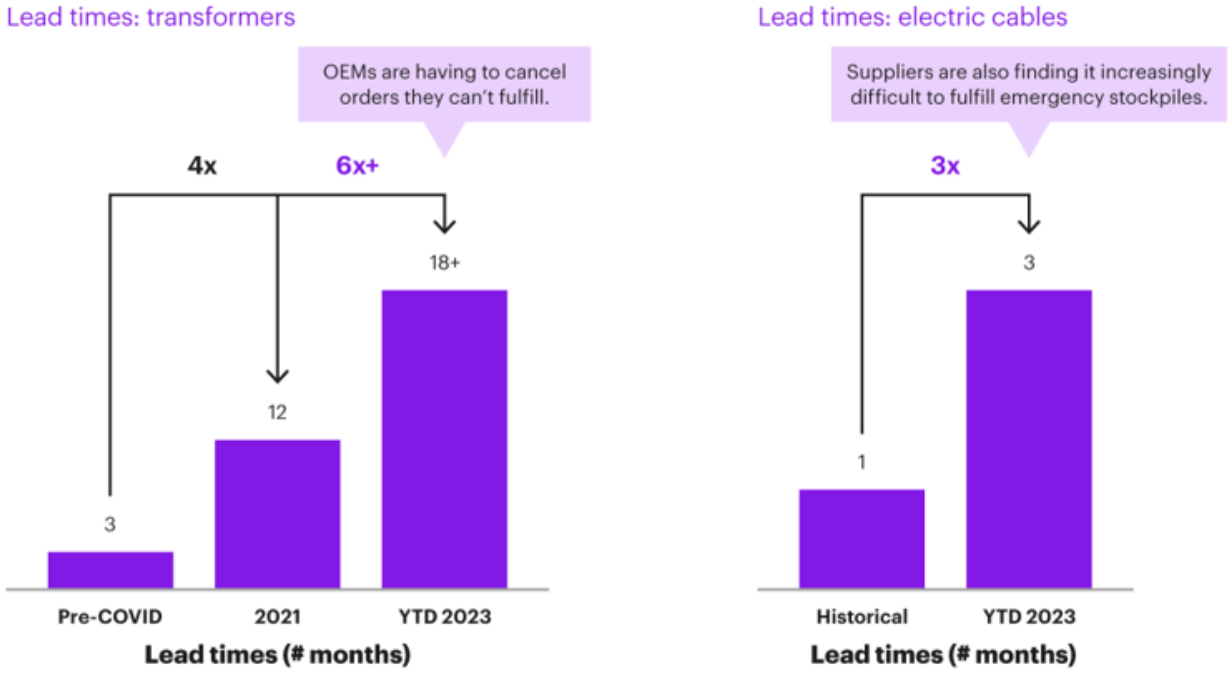
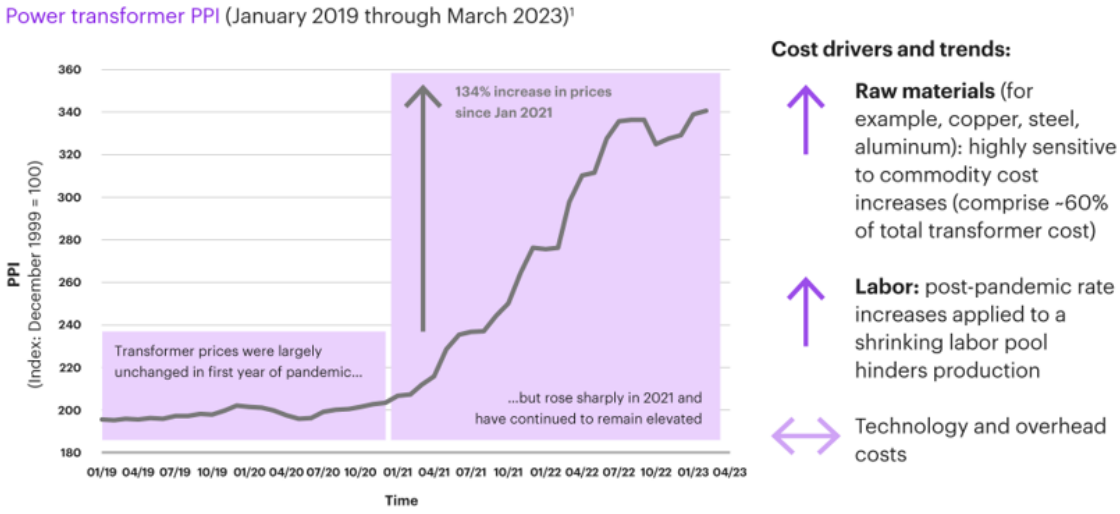


Figure 36: Equipment Lead Time Changes[96]



[95] Kearny, *Supply chain resilience can propel the power sector through the energy transition – and please investors in the process*, June 28, 2023, https://www.kearney.com/industry/energy/article/-/insights/supply-chain-resilience-can-propel-the-power-sector-through-the-energy-transition.

[96] Kearny, *Supply chain resilience can propel the power sector through the energy transition – and please investors in the process*, June 28, 2023, https://www.kearney.com/industry/energy/article/-/insights/supply-chain-resilience-can-propel-the-power-sector-through-the-energy-transition.

Supply chain disruptions result in increased operational costs, project delays, the loss of productivity, increased lead times and customer impact.

For SMUD, this means potential delays in achievement of our goals, specifically the 2030 Zero Carbon Plan. Meeting a 100 percent clean electricity goal by 2030 requires increasing SMUD's clean energy resource capacities. This means building new renewable energy projects, requiring more materials, many of which are imported. With high reliance on certain materials and competing demand from various industries, SMUD and other utilities are faced with potential delays or increased costs to achieve decarbonization. In addition, increasing customer capacity due to new construction and electrification in some instances requires new facilities be built to meet these demands.

18.10.3 Current Mitigation Efforts

The following table depicts mitigation activities for supply chain hazards.

Table 63: Current Supply Chain Hazards Mitigation

Mitigation	Description
Mutual aid agreements	SMUD has mutual aid agreements with various agencies which establish protocols for sharing resources.
Emergency contracts	Emergency contracts with vendors to support the purchase of materials or services under emergency situations.
Establish and maintain safety stock levels and inventory on hand for critical and non-critical parts	SMUD has identified safety stock limits and periodically reviews these levels in meetings to ensure that they are still appropriate. This provides guidelines for SMUD's Warehouse Operations and Procurement for purchasing requirements.
Regular risk review	SMUD has an established supply chain risk management framework which allows staff to identify and prioritize various categories of stock purchases and monitors those periodically to detect early warnings of potential current or future supply chain constraints.
Internal coordination	SMUD's Procurement Team works closely with operational areas to plan and manage supply and demand forecasts.
Qualifying suppliers	SMUD has a process that qualifies suppliers to ensure that they are responsible and can deliver materials and services in a timely manner.
Evaluate supply and logistics	SMUD conducts regular evaluation of supplier landscape, logistics, and the external workforce.
Diversifying suppliers	SMUD generally sources primary and secondary suppliers from various national and global locations to reduce risk from geographic concentration.
Project prioritization	SMUD has a system in place to identify and prioritize projects so that critical equipment is not used on a project not ready to go online.

Part 3
Mitigation Strategy

19.0 Goals and Objectives

19.1 Authorities, Policies, Programs and Resources

SMUD's mitigation strategy is made up of three components required by Title 44 of the Code of Federal Regulations (C.F.R.). These components are goals, actions, and action plan.

SMUD is owned by its customers, who elect a seven-member Board of Directors. Each director represents a different geographic region within SMUD's service territory. The job of the SMUD Board is to establish policies and values about how SMUD serves its customers and to set the long-term direction in the form of strategic directives. All important decisions made by SMUD staff must support one or more of the strategic directives.

The development of SMUD's planning process, risk assessment, goal setting and identification of mitigation actions by SMUD's PC led to the mitigation strategy and mitigation action plans for the HMP. As part of the development process, a comprehensive review of the mitigation efforts and strategies were conducted by SMUD's PC, internal and external stakeholders, and subject matter experts (SMEs). The result was the HMP for SMUD with reorganized risk assessments and priorities. The mitigation actions from the 2018 HMP were refined and reaffirmed, and goals were added and deleted, as appropriate.

Throughout the process of planning for the HMP, the PC reviewed the results of the hazard identification, vulnerability assessment, and capability assessment. The analysis of the risk assessment allowed the PC to recognize areas in which improvements could be made and provided a framework for the PC to create goals and objectives to develop new mitigation strategies for SMUD's Plan Area.

Daily operations and decision-making are delegated by SMUD's Board of Directors to the General Manager and Chief Executive Officer, who along with other members of the Executive Team establish guidelines for SMUD activities. The most prominent guideline set by the Executive Team is SMUD's 2023-2026 Strategy. The top priority area is to Be Safe Always, which has a direct relationship to hazard mitigation. This commitment at the Executive level to safety is critical for SMUD whose primary activity is the generation and delivery of electricity. Not only is the generation and transmission of electricity an inherently hazardous activity but using stored water in mountainous terrain under pressure as the means of electrical generation expands the hazard.

SMUD management, departments, and employees recognize, value, and support projects that ensure a well-planned, coordinated, efficient, and rapid response in the event of an emergency to protect the lives, environment, and property of the citizens in communities where our assets and operations reside.

19.2 Risk Prioritization

SMUD's HMP leverages its existing ERM framework to identify and determine the hazards that SMUD is most vulnerable to. The ERM framework takes into consideration impacts to

SMUD's finances, legal, regulatory and compliance, operations, reputation, public safety, environment, and workforce. All hazards that are addressed in this plan have the capability of damaging SMUD's assets and operation in the Plan Area, and wildfire, drought, flood, and climate change are the most crucial.

19.3 Existing Mitigation Strategies

To identify and select mitigation actions that need to have additional practices implemented, or changed, the PC began by prioritizing hazards that were of high risk to SMUD's Plan Area. Hazards of high risk were those in which current mitigation actions needed to be re-analyzed, and it needed to be decided if additional mitigation actions could be implemented using SMUD's current technological capabilities. Low-priority hazard risks are often mitigated using mitigation actions of less specificity than those of high-priority hazards.

Once priority was determined, the PC analyzed additional actions that supported the identified goals and objectives of the HMP. The PC utilized examples of potential mitigation actions from a variety of other agencies. Preventative mitigation alternatives were discussed for each hazard, and additions were made to the existing strategies as deemed necessary.

Mitigation actions are listed with the associated hazards.

19.4 Mitigation Action Plans

Planning and prioritization of projects at SMUD is performed through a variety of mechanisms. High level guidance is provided in SMUD's 5-Year Strategic Plan (Strategic Plan), which represents a balance between the strategies, projects, programs, and other initiatives aimed at ensuring SMUD's success in an evolving energy industry. Goals and initiatives referenced in the Strategic Plan translate into more specific, action-oriented policies or projects and thus serve as a framework for achieving the intent of the Strategic Plan.

From this and other forms of guidance, individual asset managers, such as the UARP Asset Manager, must prepare a 3-Year Budget Plan that identifies operations and maintenance (O&M) and capital projects that are anticipated over the course of the next three years. The 3-Year Budget Plan is reviewed by the respective business area Directors and is recommended to the Executives, then the Board for final approval.

The priority associated with each project during each budget cycle is dependent on several factors that affect the relative importance of a project in any given year. Projects are either mandatory or discretionary and their inclusion in any given year's plan is based on regulatory requirements or their relationship to SMUD's guiding principles.

SMUD also evaluates projects across the organization to ensure Operational Excellence. This essentially translates into our Project Portfolio Management, which seeks to coordinate and align SMUD-wide resource allocation and operations over a 2-3-year planning horizon. A group of leaders from across SMUD, called the Operational Alignment

Team (OAT), meets regularly to select the overall portfolio of projects, both mandatory and discretionary, track progress throughout the year, and approve significant changes.

Each of these activities (OAT meetings, departmental planning, and project reviews) employ the same prioritization process that results in the general project classifications of high, medium, and low priority projects. The criterion for the three priority categories includes the following:

High Priority Project Criteria

- Needed to promote safety and protect the lives of SMUD workers and the public,
- Needed to protect SMUD infrastructure and public property,
- Risks are tied to recent disasters and expected to worsen under climate change,
- Strong public support,
- Viewed favorably or required by regulatory agencies,
- Strongly tied to the maintenance of electric stability and reliability,
- Clear and concrete long-term and lasting benefits,
- Highly favorable benefit/cost ratio, and/or
- Supported by pilot projects and/or other successful applications.

Medium Priority Project Criteria

- Enhancements to safety and protection of lives, but not absolutely needed,
- Enhancements to the protection of SMUD infrastructure and public property,
- Risks are not strongly tied to recent disasters and climate change,
- Moderate public support,
- Viewed as neutral by regulatory agencies,
- Uncertain and theoretical duration of benefits,
- Neutral benefit/cost ratio, and/or
- No pilot projects or other successful applications.

Low Priority Project Criteria

- Limited relationship to safety and the protection of SMUD workers and the public,
- Limited value in the protection of SMUD infrastructure and public property,
- Minimal to no public support,
- Risk(s) is/are not associated with historical disasters and not affected by climate change,
- No regulatory requirement, and/or
- Cost does not justify the benefits achieve from project deployment.

19.5 Plan Integration

An important project implementation mechanism is to incorporate the recommendation into existing business processes. The hazards outlined in this HMP will be one factor in risk assessments and review of projects and initiatives for SMUD and will be integrated into the project planning, budget, and risk assessment process.

20.0 Mitigation Best Practices and Adaptive Capacity

SMUD carries the primary responsibility for implementing and updating hazard mitigation strategies. The HMP is a living document that will be revised and improved over time to increase its effectiveness in implementing and properly tracking mitigation strategies. Staff will leverage SMUD's existing planning process in the implementation of this HMP.

20.1 Progress of Mitigation Efforts

SMUD's ERM Office (ERMO) (along with various associated business units) will monitor the implementation of each hazard mitigation, and the progress made towards the goals of the evolving, HMP. The PC will review and update the status of the implementation of mitigation actions on an annual basis. To standardize the monitoring of the HMP goals, status updates of its specific goals will be integrated into the existing ERM program activities.

SMUD's ERM program will consider the following to evaluate the effectiveness of the HMP:

- Has the risk environment changed?
- Are there other new and emerging risks that have the potential to impact the Plan Area?
- Do the identified goals and actions address the current and expected conditions?
- Have the mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the mitigation plans?
- Should additional resources be committed to address the identified risks?
- What needs to be changed in order to achieve the expected outcome?

The ERMO is responsible for coordinating periodic discussions with stakeholders to perform a review of mitigations and consider whether mitigations need to be reestablished and/or are still relevant to the corresponding potential hazards.

It is important to note that addressing potential hazards requires viewing hazard mitigation strategies as long-term practices. However, these hazard mitigation strategies have a necessity to constantly evolve and become enhanced due to the growing threat of climate change and the speed of technological advances. Climate change is expected to increase the rate of and exacerbate hazards. This may require the adoption of new technology and the innovation of new mitigation techniques.

SMUD will need to constantly integrate the growing impacts of climate change into the HMP's hazard mitigation strategies. It is possible that efforts to reduce risk in the short-term may increase risk in the long-term.

20.2 Change in Priorities

SMUD's Executive Team reviews changes and proposed additions to the Enterprise Portfolio on a monthly basis to account for changes in commodity markets, work

progression, and adjustments to our priorities. The monthly Enterprise Portfolio Review meeting kicks off with our “Strategic Pulse Check” to ensure staff are focused on key projects and updates are made to the 6 Month Look Ahead. Both financial and performance snapshots are then reviewed for year-to-date progress towards our financial and operational goals. Project starts, stops, and changes impacting the portfolio are discussed for decision by the Executive team. New work presented to this team goes through the same process and scoring methodology as our annual planning process to review business case and resource availability. This information and approvals of new work enables SMUD to continually review and optimize our Enterprise Portfolio.

21.0 Action Plan and Implementation

21.1 Status of Previous Plan Actions

21.1.1 Mitigation Actions

The following table provides the status of prior mitigation actions.

Table 64: Status of Prior Mitigation Actions

Project Title	Hazard Addressed	Funding Type	Status
UARP Culvert System Upsizing	Flood	HMPG grant	In progress
BRIC - Microgrid Scoping Project	Multiple	HMPG grant	In progress
PCA Fire Hardening	Fire	HMPG grant	In progress
Undergrounding 4kV lines in UARP	Wildfire	Electrical rates	Complete
Storm Preparation Work	Severe weather	Electrical rates	On going
Install non-expulsion devices in PCA	Wildfire	Electrical rates	On going
UARP 4kV circuit breakers will be upgraded to allow remote de-energization of lines.	Wildfire	Electrical rates	Complete
Replace #6 copper conductors with heavier gauge aluminum.	Wildfire	Electrical rates	Complete
Upgrade existing 12kV feeders to SCADA reclosers in PCA	Wildfire	Electrical rates	In progress
Strengthen fire break valve via UARP fuels reduction	Wildfire	Electrical rates	On going
Visual and Infrared (IR) inspections on substation equipment	Wildfire tree mortality	Electrical rates	On going
Continuous assessment and mitigation	All hazards	Electrical rates	On going
Sacramento Resilient Grid Initiative	Energy shortage	REDI grant	Complete

21.1.2 Status of Plan Incorporation Actions

SMUD's Enterprise Prioritization process helps to ensure alignment across SMUD, focused on delivering the things that are most important to the organization, customers, and community. This includes the evaluation, assessment, and prioritization of work to meet SMUD's key strategic and operational business goals, strategic portfolio management, and facilitation of Executive investment decisions.

21.2 Plan Prioritization

21.2.1 Benefit/Cost Review

Initiatives within the action plan must be prioritized according to a benefit/cost analysis (44 C.F.R. § 201.6(c)(3)(iii)). Projects and initiatives that address hazard mitigation will follow SMUD's current Enterprise Prioritization Process

SMUD's Enterprise Prioritization scoring methodology consists of 4 components – Strategic Alignment, Risk, Business Unit Criticality, and Financials. Our Strategic Alignment component encompasses the benefit to the organization and strategy of completing the work. SMUD leverages a weighted scoring methodology, with the individual weighting of each component to be determined annually based on the current environment SMUD is facing for the upcoming year. Typically, the strategic alignment and risk components are more heavily weighted than the other components.

The financial score will only consider costs and financial savings or revenue that will be reflected in SMUD's budget. Cost savings to customers or risk-based cost calculations are not included. The score requires a calculation of net present value, which is today's value of expected cash flows minus today's value of invested cash. Present value of lifetime cost minus present value of lifetime benefit.

21.2.2 Grant Pursuit Priority

The priority for pursuing funding for each action was assigned based on the following criteria:

- **High priority –** An action that
  - meets identified grant eligibility requirements,
  - has high benefits,
  - is a prioritized via Enterprise Prioritization, and
  - local funding options are unavailable, limited, or available local funds could be used instead for actions that are not eligible for grant funding.
- **Medium priority –** An action that
  - meets identified grant eligibility requirements,
  - has medium or low benefits,
  - is prioritized via Enterprise Prioritization, and
  - local funding options are unavailable, limited, or available local funds could be used instead for actions that are not eligible for grant funding.
- **Low priority –** An action that
  - has not been identified as meeting any grant eligibility requirements.

21.3 Mitigation Actions Implementation Plan

The following table depicts current mitigation actions.

Table 65: Mitigation Actions Implementation

Hazard	Title	Priority	Owner	Possible Funding Source	Description	Status
All hazards	Capital Region Climate Readiness Collaborative (CRCRC)	High	Research and Dev.	Electrical rates	SMUD continues to participate in the CRCRC to develop and grow its memberships to identify solutions for regional impacts of climate change.	On going
Fire	Wildland Fire Mitigation through Fuels Reduction - Sacramento	High	Vegetation Mgmt.	HMPG Grant	Vegetation clearance in SMUD's Pole Clearing Area	Awaiting FEMA response
Energy shortage	AB327/More than SmartGrid Modernization Research	High	Distribution Operations and Main.	Electrical rates; grants	This broadens distribution planning efforts to consider DER alternatives when cost effective in comparison to traditional projects and includes distribution infrastructure deferral demonstrations using DER.	2018-2020
Fire	Community Education	High	SMUD	Electrical rates	Continue to educate private property owners about the dangers of vegetation near distribution lines and service drops.	On going

Table 65: Mitigation Actions Implementation						
Hazard	**Title**	**Priority**	**Owner**	**Possible Funding Source**	**Description**	**Status**
Flood hazards; Dam safety	Dam Safety Project	High	Power Gen.	Electrical rates	Two primary activities: (1) a Dam Potential Failure Mode Analysis, and (2) an independent consultant assessment.	2018
Severe storms	UARP Culvert Replacement Project	High	Power Gen.	Electrical rates; grant funding	Upsize or replace culverts in UARP.	On going
Flood	FEMA HMGP Advance Assistance for Flood Study	Medium	Substation Assets	HMPG Grant	Conduct an inundation study for substations	Awaiting FEMA response
Flood	FEMA HMGP Advance Assist. for Gas Pipeline Engineering Study	Medium	Gas Pipeline	HMPG Grant	Conduct inundation study for gas pipelines	Awaiting FEMA response
All hazards	Focused Climate Research	Medium	Research and Dev.	Electrical rates	Staff participation in California's Fourth Climate Assessment, which produces regional reports for the first time, and Governor's Integrated Climate Adaptation and Resiliency Program (I-CARP) Technical Advisory Council to maintain awareness of the latest peer-reviewed research findings.	On going

Table 65: Mitigation Actions Implementation						
Hazard	**Title**	**Priority**	**Owner**	**Possible Funding Source**	**Description**	**Status**
All hazards	SMUD Nature Preserve Mitigation Bank	Medium	Env. Services	Electrical rates	SMUD continues to monitor a multi-species/ multi-habitat mitigation bank that provides for long-term protection of special status species and habitats found within SMUD's service territory.	On going
Extreme heat	SMUD Cool Roof Incentive	Medium	Customer	Electrical rates	Incentive programs for SMUD customers.	On going
Fire hazards; Tree mortality; Energy shortage	Forest Thinning, Stream, and Revenue Flows and UARP	Medium	Vegetation Mgmt.	Electrical rates; grants	This work is to improve the safety of mountain communities expand water resources and reduce smoke and air quality impacts associated with catastrophic wildfires. There is a proposed ten-year study to better understand the long-term impact of potential changes in forest management practices.	On going

Table 65: Mitigation Actions Implementation						
Hazard	**Title**	**Priority**	**Owner**	**Possible Funding Source**	**Description**	**Status**
Fire; Tree mortality	Wildland Fire Mitigation through Fuels Reduction for Sacramento and El Dorado County	Medium	Vegetation Mgmt.	Electrical rates; grant funding	Fuel reduction treatments including thinning, brushing, removal of forest slash and mastication along the full extent of the project corridors.	On going
Flood hazards	Flood Data Climate Exposure Evaluation	Medium	Grid Assets	Electrical rates	SMUD is conducting a levee breach study to identify assets likely to be affected by several breach scenarios updated in the last year by the City and County of Sacramento.	On going
Severe storms	Public Outreach	Medium	SMUD	Electrical rates	Encourage critical facilities in the SMUD plan area to have backup power and emergency operations plans to deal with power outages.	On going
Tree mortality; Extreme heat; Energy shortage	SMUD Shade Tree Program	Medium	Customer	Electrical rates	Program encouraging residents to strategically plant shade trees around their home to reduce energy consumption.	On going

Table 65: Mitigation Actions Implementation						
Hazard	**Title**	**Priority**	**Owner**	**Possible Funding Source**	**Description**	**Status**
All hazards	Regional Bio sequestration	Medium	Research and Dev.	Electrical rates; private investors	Public-private partnerships (with land trusts, open space conservatives or private landowners) to leverage carbon offset protocols and create new revenue streams and other incentives to preserve and expand land-based carbon storage.	On going
Earthquake	Seismic Vulnerability	Low	SMUD	Electrical rates; grants	Consider seismic vulnerability assessments and develop mitigation strategies for seismic retrofit of critical utility infrastructure identified as particularly vulnerable.	On going
Fire; Severe storms	Systems Upgrade	Low	Grid Assets	Electrical rates; grant	Where appropriate, upgrade lines and poles to improve wind loading, and add interconnect switches to allow alternative feed paths and disconnect switches to minimize outage areas.	On going

Table 65: Mitigation Actions Implementation						
Hazard	**Title**	**Priority**	**Owner**	**Possible Funding Source**	**Description**	**Status**
All hazards	Other	Medium/ High	SMUD	Electrical rates; grants	Other hazard mitigation plans identified through annual planning process	On going

Part 4
Plan Maintenance

22.0 Plan Adoption, Implementation and Maintenance

22.1 Plan Adoption

SMUD operates under the oversight and guidance of its Board of Directors. SMUD's 2018 HMP was adopted by SMUD's Board of Directors on June 24, 2019. As part of the process of updating and implementing the 2024-2028 HMP Update, a preliminary version of this plan was presented to the Board of Directors on (Date) at the (Name of Committee Meeting). Following input from the Board, the HMP was then submitted to Cal OES and ultimately to FEMA for review and acceptance.

Within approximately eight weeks of FEMA's pre-approval of the HMP, the final plan will be presented to SMUD's Board of Directors during a regularly scheduled meeting for formal adoption.

22.2 Plan Implementation

The effectiveness of the HMP depends on the implementation and incorporation of its action items into existing planning processes. This HMP will serve to support SMUD's decision-making process in the next 5-years. The mitigation activities will be prioritized according to SMUD's budget and planning process.

22.3 Plan Maintenance

22.3.1 Integration with Other Planning Processes

The mitigation activities within the HMP will follow SMUD's Enterprise Prioritization process as outlined in section 21.3.1. Benefits/Cost Review.

22.3.2 Plan Evaluation and Monitoring

Evaluation of progress will be recognized by monitoring changes in the hazard risk-potentials that have been identified previously in the HMP. Changes in risk-potential can be denoted as:

- Increased hazard risk-potential because of a new development. [97]
- Increased hazard risk-potential because of a changed mitigation strategy.
- Decreased hazard risk-potential because of the success of a mitigation strategy.

Updates to the HMP will include the above changes in risk-potential as well as:

- Recognizing new hazards that arise in SMUD's Plan Area.
- Utilizing new data or studies on current and/or future hazards.
- Incorporating new capabilities in mitigating specific hazards.
- Incorporating newly acquired assets and all growth and development of current infrastructure.

[97] Be it naturally occurring, or human caused.

Updates to the HMP will also be made to accommodate actions that have failed or are not considered feasible after a review of their consistency with the established progress markers.

22.3.3 Plan Update Method and Schedule

SMUD will update the HMP, formally, every five years. The update process will begin in the 3–4-year period to give sufficient time for stakeholder engagement and evaluation of actions. Additionally, SMUD will be tracking the mitigation efforts through its existing business processes. Mitigations will be reviewed during the annual prioritization process and periodic enterprise risk reviews. Progress of any hazard mitigation projects will be tracked through the existing project management reporting process. Updates during these processes will be integrated into the plan as appropriate. The updates will be reviewed by the PC periodically and finalized during the 3–4-year review period. Maintenance of the HMP will be conducted in accordance with DMA 2000.

The ERMO is responsible for initiating plan maintenance, and tracking status updates of installed mitigation efforts and changing threats in SMUD's Plan Area. Following a hazard event triggering SMUD's Emergency Operation Center (EOC), the ERMO will revisit the plan to ensure mitigation strategies are being implemented as stated and to discuss possible future changes to the HMP. The next formal plan update for the SMUD HMP will occur five years from the date that this HMP is approved by Cal OES and FEMA.

22.4 Continuing Public Involvement

The draft HMP and final approved HMP will remain available to the public on the HMP website. The public can continue to provide comments on the HMP directly to ERM@smud.org and during public Board and Committee meetings. Any public input will be incorporated into the next formal HMP update process.

22.5 Mitigation Plan Point of Contact

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APPENDIX A

Table 66: Table of Acronyms			
Acronym	**Definition**	**Acronym**	**Definition**
Cal OES	California Governor's Office of Emergency Services	**USFS**	United States Forest Service
FEMA	Federal Emergency Management Agency	**BLM**	Bureau of Land Management
SMUD	Sacramento Municipal Utility District	**CalFire**	California Department of Forestry and Fire Protection
HMGP	Hazard Mitigation Grant Program	**kWh**	Kilowatt hours
PDM	Pre-Disaster Mitigation Assistance Program	**MW**	Megawatts
FMA	Flood Mitigation Assistance Program	**kV**	Kilovolt
FMAG	Fire Management Assistance Grant	**SD**	Strategic Directions
PA	Public Assistance	**GHG**	Greenhouse gas
DMA 2000	Federal Disaster Mitigation Action of 2000	**GW**	Gigawatt hour
Annexation Plan	El Dorado County LHMP Annex	**cfs**	Cubic feet per second
MJ-LHMP	Multi-jurisdictional Local Hazard Mitigation Plan	**ft.**	Feet
LHMP	Local hazard mitigation plan	**ac-ft.**	Acre feet
HMPC	Hazard Mitigation Planning Committee	**PG&E**	Pacific Gas and Electric Company
EROC	Enterprise Risk Oversight Committee	**WTG**	Wind turbine generators
CUEA	California Utilities Emergency Association	**SRCSD**	Sacramento County Sanitation District
SOC	State Operations Center	**SFA**	SMUD Financing Authority (Cosumnes Power Plant)
MOU	Memorandum of understanding	**CVFA**	Central Valley Financing Authority (Carson Cogeneration Project)
UOC	Utility Operations Center	**SCA**	Sacramento Cogeneration Authority (Procter & Gamble Cogeneration Project)
REOC	Regional Emergency Operations Center	**SPA Project**	Sacramento Power Authority (Campbell Soup Cogeneration Project)
SEMS	Standardized Emergency Management System	**SPA McClellan**	Sacramento Power Authority (McClellan Gas Turbine)

Table 66: Table of Acronyms			
Acronym	**Definition**	**Acronym**	**Definition**
CRC	Capital Region Climate Readiness Collaborative	**WAPA**	Western Area Power Administration
EDCFSC	El Dorado County Fire Safe Council	**Dth**	Dekatherm
FFSC	Folsom Fire Safe Council	**COTP**	California Oregon Transmission Project
NATF	North American Transmission Forum	**COI**	California-Oregon Intertie
CPUC	California Public Utility Commission	**TANC**	Transmission Agency of Northern California
PDP	Peer Development Panel	**UCS**	Union of Concerned Scientists
UARP	Upper American River Project	**FPRP**	Fire Prevention and Response Plan
EAP	Emergency Action Plan		
FERC	Federal Energy Regulatory Commission	**IOU**	Investor-owned utilities
GPO	Gas pipeline operations	**UAS**	Unmanned aerial systems
NCDC	National Climatic Data Center	**FIS**	Geographic Information Systems
SAFCA	Sacramento Area Flood Control Agency	**EOC**	Emergency Operation Center
in,	Inch	**SRA**	State responsibility area
FIRM	Flood Insurance Rate Map	**FR3**	Fire retardant insulating fluid
USGS	United States Geological Survey	**IR**	Infrared Information System
DOE	Department of Energy	**NWS**	National Weather Service
TACs	Toxic air contaminants	**mph**	Miles per hour
NIDI	National Integrated Drought	**ISFSI**	Independent Spent Fuel Storage Installation
SAR	Safety Analysis Report	**ERM**	Enterprise Risk Management
ERMO	Enterprise Risk Management Office		

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