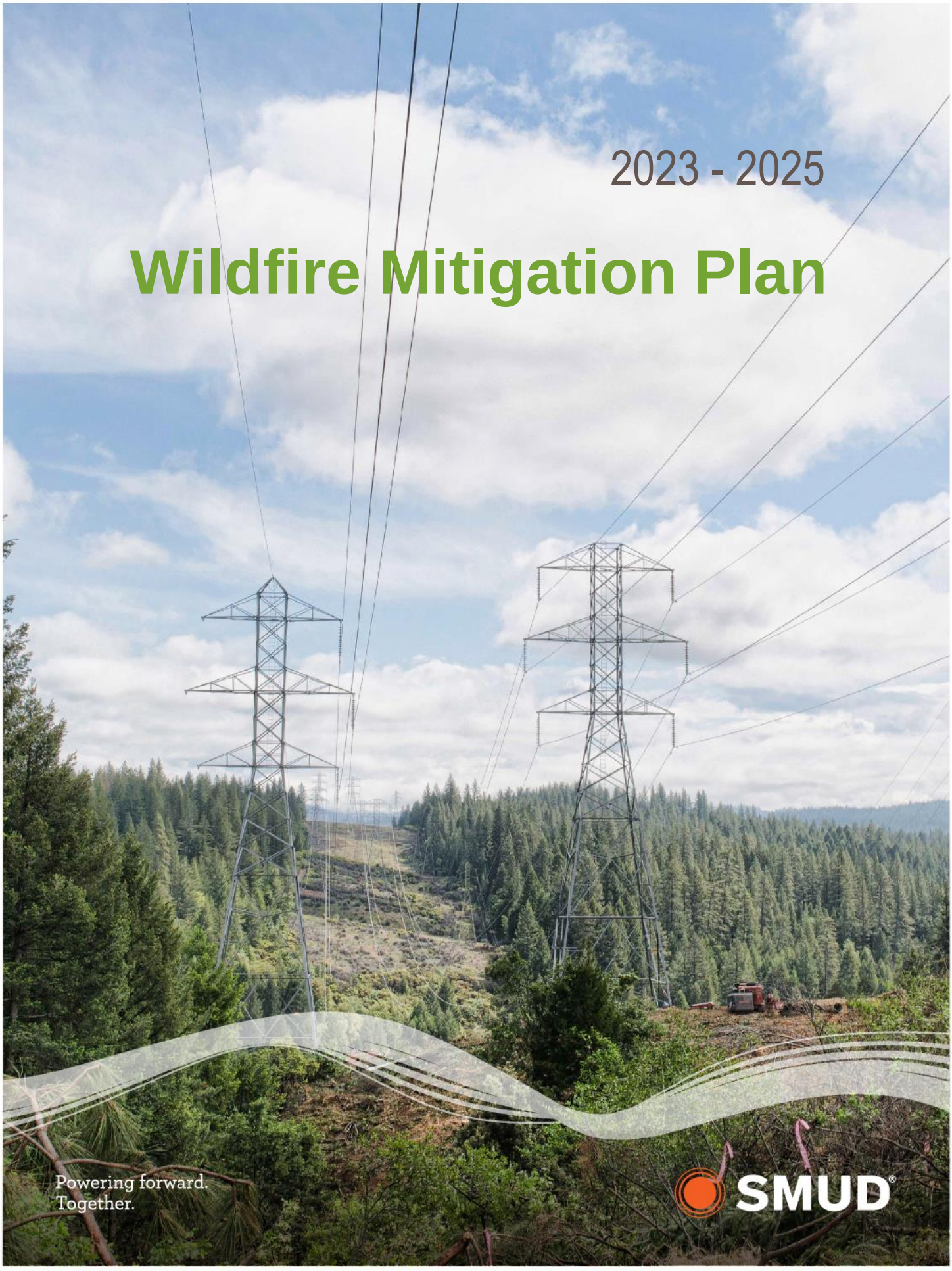
2023 - 2025
Wildfire Mitigation Plan
Powering forward.
Together.
SMUD®

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1 Executive Summary

SMUD's Wildfire Mitigation Plan (WMP) continues to build on our success implementing best practices and lessons learned from prior revisions and reflects the continued progress we made on risk reduction projects and programs.

SMUD's service area is outside of CPUC's High Fire Threat District's (HFTD) Tier 2 and Tier 3 areas. SMUD does own and operate transmission lines and hydro power plants located in Eldorado County, which is within HFTD Tier 2 and Tier 3. The bulk of SMUD's efforts are focused on reducing fuel around our facilities to reduce ignition risk.

One project that was completed in 2022 designed to reduce ignition risk was the undergrounding of three miles of 4kV distribution lines between hydro facilities in CPUC HFTD Tiers 2 and 3. Several overhead spans remain, one of which was upgraded to tree-wire. The remaining spans are underbuilt on 69kV structures over rocky terrain. Undergrounding the lines resulted in elimination of ignition risk from vegetation, animals, and other objects.

Climate change has resulted in California experiencing some of the most severe drought conditions in the past few years. The lack of rain and snow enabled SMUD to achieve better than projected progress in the UARP fuels reduction project. Contracted tree crews covered significant ground in removing trees, shrubs, and thinning operations. The project aims to remove fuels below, and up to 200 feet from either side of the transmission lines in the UARP. This progress will allow SMUD to complete the project well ahead of schedule.

SMUD continues to search out new technologies aimed at reducing ignition risk. One example is the use of drone ariel photography that provided better than expected results. High-resolution aerial photography with desktop inspections helped identify many equipment issues which would not have been caught during normal visual inspections. A total of 465 transmission structures were photographed and inspected with this new technology. Repairs were promptly scheduled and performed as needed. This project reduced the risk of conductor, hardware and structure failure which could possibly result in ignition. Another new technology we leveraged is x-ray of conductor splices. The x-ray technology allowed SMUD to reinforce splices that showed internal corrosion, which would result in potential splice failure resulting in conductors falling to the ground. A total of seven splices were reinforced.

Although SMUD's service territory is outside the CPUC HFTD, SMUD has been installing Cal FIRE exempt arrestors, connectors, and fuses in the Pole Clearing Area (PCA). The project was extended due to impacts of COVID-19 and is on track for completion by 2025. SMUD was able to offset the costs of the project's final three years due to a FEMA grant, which is a big win for SMUD customers.

COVID-19 brought unanticipated challenges to mitigation efforts. Supply chain and contractor availability disruptions impacted every utility, including SMUD. Material delivery lead times increased dramatically for many items, resulting in delays to project completion. SMUD staff worked directly with vendors and suppliers to obtain materials and better handle lead times and priority deliveries. Progress was delayed but continues on revised schedules.

As part of the comprehensive review of the WMP, SMUD staff performed a risk analysis using the bow-tie approach. The risk analysis included discussions of risk reductions due to project completions in the UARP and PCA. Impacts of climate change, drought and summer heat storms were also discussed.

The various programs and projects described in this WMP provide a comprehensive and innovative approach to SMUD's wildfire risk reduction.

2 Introduction

Over the last decade, California has seen some of its most devastating and destructive wildfires. Climate change impacts, including warmer days and nights, longer heat events, drought, and changes in precipitation patterns, are recognized to be large contributing factors. The expansion of the wildland-urban interface, historical development patterns and land management practices are factors as well. These realities require utilities to develop a new way of thinking about wildfire mitigation planning.

Senate Bill (SB) 901 was authored by Senator Dodd and enacted in 2018. SB 901 requires all electric utilities to prepare a wildfire mitigation plan (WMP).

SB 901 amended Public Utilities Code (PUC) section 8387. Assembly Bill (AB) 1054 (Holden, 2019) further amended this statute. Section 8387 generally requires every publicly owned utility to construct, maintain and operate its electrical facilities to minimize the risk of wildfire posed by those facilities. As amended by SB 901 and AB 1054, section 8387 more specifically requires every publicly owned utility to prepare a WMP and update it annually, with a comprehensive revision of the WMP no less than every three years.

WMPs must include vegetation management (VM) programs, inspection and maintenance programs, protocols for deactivating automatic reclosers and for de-energizing power lines during severe weather conditions in high fire threat areas. The plan is required to identify priority customers, such as first responders and local agencies, health care providers, water and telecommunication facilities, groups that assist children, elderly, mobility impaired and other vulnerable populations and include communication programs for those customers. The plans need to describe how service will be restored after a wildfire and include processes for (i) measuring the performance of the plan, (ii) identifying and correcting any deficiencies in the plan and (iii) auditing implementation of the plan.

The Sacramento Municipal Utility District (SMUD) Board of Directors adopted the initial WMP on October 17, 2019. Updates were adopted annually. This is SMUD's comprehensive triennial update.

2.1 Utility overview and context

Table 1 provides summary information to highlight SMUD's unique characteristics impacting its low wildfire risk. This information changes minimally each year and is refreshed, at a minimum, with SMUD's triennial comprehensive WMP review.

Table 1 Context Setting Information

Utility Name	SMUD	
Service Territory Size	900 square miles	
Owned Assets	X Transmission X Distribution X Generation	
Number of Customers Served	Approximately 648,000 customer accounts	
Population Within Service Territory	Approximately 1.5 million people	
Customer Class Makeup	*Number of Accounts*	*Share of Total Load (MWh)*
	88.3% Residential; 1.5% Government; 0.4% Agricultural; 8.6% Small/Medium Business; 1.3% Commercial/Industrial	45% Residential; 5.8% Government; 0.8% Agricultural; 7.1% Small/Medium Business; 41.3% Commercial/Industrial
Service Territory Location/Topography[1]	25.8% Agriculture 0.1% Barren/Other 0% Conifer Forest 0% Conifer Woodland 0% Desert 0.3% Hardwood Forest 3.9% Hardwood Woodland 29.5% Herbaceous 0.1% Shrub 37.9% Urban 2.3% Water	
Service Territory Wildland Urban Interface[2] **(based on total area)**	6.3% Wildland Urban Interface; 9.1% Wildland Urban Intermix;	
Percent of Service Territory in CPUC High Fire Threat Districts (based on total area)	☐Includes maps Tier 2: 0% Tier 3: 0% SMUD operates its Upper American River Project outside its territory within the High Fire Threat District	
Prevailing Wind Directions & Speeds by Season	☐ Includes maps CalFire provides the following description in its 2021 Strategic Fire Plan Amador-El Dorado Unit (AEU): "Fire weather for AEU is typically dominated by three general weather phenomena; the delta push influence, north wind events, and east foehn winds caused by high pressure development in the Great Basin. All three weather conditions cause potential increases in fire intensity and size. The delta influence is the most common and surfaces frequently throughout summer. Typically, high pressure systems will dominate Northern California in the summer months bringing extremely hot and dry conditions *over* much of the region. As these systems develop, they will tend to yield near the Delta and Sacramento areas bringing the marine influence to the Unit. This is generally considered a good thing for fire behavior; slightly cooler afternoon temperatures and increases in relative humidity. The downside is the strong winds that typically accompany these patterns can override any benefit that	

[1] This data is based on the California Department of Forestry and Fire Protection, California Multi-Source Vegetation Layer Map, depicting WHR13 Types (Wildlife Habitat Relationship classes grouped into 13 major land cover types) *available at*: https://www.arcgis.com/home/item.html?id=b7ec5d68d8114b1fb2bfbf4665989eb3.

[2] This data is based on the definitions and maps maintained by the United States Department of Agriculture, as most recently assembled in *The 2010 Wildland-Urban Interface of the Conterminous United States*, ***available at*** https://www.fs.fed.us/nrs/pubs/rmap/rmap_nrs8.pdf.

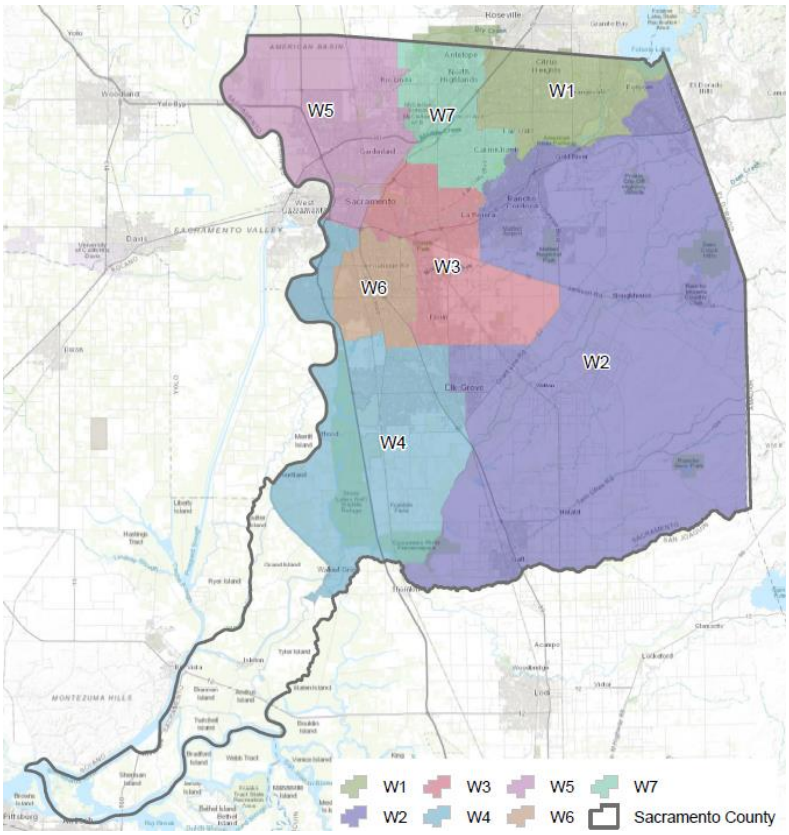
Utility Name	SMUD
	may come from marine air. Typically, this type of wind will subside after sundown causing fire behavior to drop off dramatically. The other critical wind patterns that are difficult to predict for AEU are the Northerly and Easterly winds. They are relatively rare, and often are forecasted only the day before. Northerly or Easterly winds are typically warmer and drier than most other wind patterns due to air compression. These conditions provide the perfect environment for increased fire intensity and large fire growth. Fire growth is typically wind driven, however as these events recede, fire immediately returns to fuel/topography driven in opposing directions to the wind driven direction. This type of wind event is commonly referred to as a Santa Ana Wind in Southern California, and a foehn wind in the Sierra/Cascade Region." 2021 Strategic Fire Plan Amador-El Dorado Unit, 2021 Amador El Dorado Unit Strategic Fire Plan (ca.gov)
Miles of Owned Lines Underground and/or Overhead	Overhead Dist: 3,868 miles Overhead Trans: 469 miles Underground Dist: 6,819.5 miles Underground Trans: 17.3 miles
	Explanatory Note 1 - *Methodology for Measuring "Miles":* [e.g., circuit miles, line miles.] Circuit miles.
	Explanatory Note 2 – *Description of Unique Ownership Circumstances:* None
	Explanatory Note 3 – *Additional Relevant Context:* [e.g., percentage of lines located outside service territory] See Table 5 on page 22 in SMUD's WMP.
Percent of Owned Lines in CPUC High Fire Threat Districts	*Overhead Distribution Lines as % of Total Distribution System (Inside and Outside Service Territory)*
	Tier 2: 0% Tier 3: 0%
	Overhead Transmission Lines as % of Total Transmission System (Inside and Outside Service Territory)
	Tier 2: 19% Tier 3: 11.7%
	Explanatory Note 4 – *Additional Relevant Context:* No Tier 2 or Tier 3 areas exist within SMUD's Service Area. SMUD's overhead facilities in the High Fire Threat District are part of its Upper American River Project (UARP) (see Section 5 on page 22).
Customers have ever lost service due to an IOU PSPS event?	☐ Yes X No
Customers have ever been notified of a potential loss of service due to a forecasted IOU PSPS event?	☐ Yes X No
Has developed protocols to pre-emptively shut off electricity in response to elevated wildfire risks?	X Yes ☐ No
Has previously pre-emptively shut off electricity in response to elevated wildfire risk?	X Yes ☐ No If yes, then provide the following data for calendar year 2022: *Number of shut-off events*: 0 *Customer Accounts that lost service for >10 minutes:* N/A *For prior response, average duration before service restored:* N/A

Note: Data reflects year-end 2022

2.1.1 SMUD profile

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 area by Wards



As a publicly owned 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 50 percent carbon free and SMUD has a goal to reach zero carbon in its electricity production by 2030. SMUD is one of the largest community-owned electric utilities in the nation, recognized internationally for its innovative energy efficiency programs and use of renewable power technologies.

SMUD owns, operates, and has ownership interests that are critical to maintaining the flow of power from generating facilities through the transmission lines to SMUD's service area. These assets are in the geographic areas of Sacramento, El Dorado, Solano, and Placer Counties.

2.1.2 The service area

SMUD is the primary electric distribution service provider within an area of approximately 900 square miles in central California, serving a population of approximately 1.5 million. The service area includes Sacramento, the State Capital, and the populous areas principally to the northeast and south of the City of Sacramento and the agricultural areas to the north and south.

2.1.3 The distribution and transmission system, Sacramento County

SMUD owns and operates a vertically integrated electric system that includes generation, transmission, and distribution facilities.

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 Company (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 city of 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.

SMUD's record peak load of 3,299 MW occurred on July 24, 2006. Current and historical load statistics can be found at our website: https://www.smud.org/en/Corporate/About-us/Company-Information/Reports-and-Statements

2.1.4 The hydroelectric system in the UARP, Eldorado County

SMUD owns and operates ten hydroelectric powerhouses rated at approximately 700MW in the Western Sierra Nevada Mountain region. The hydroelectric system spans approximately 50 miles with the highest elevation reservoir at Loon Lake and descends the mountain range terminating at Chili Bar reservoir. Eight hydroelectric powerhouses are interconnected with dedicated 69kV and 230kV transmission lines. The most recent additions are two small hydroelectric powerhouses, which interconnect 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 man-made reservoirs in the area. A small dedicated 4kV distribution system serves various valve and gate control houses for the reservoirs, a ranger station, a lift 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.

2.1.5 The wind power collector system in the Delta, Solano County

SMUD owns and operates a 358MW wind project, located in Solano County, known as The Solano Wind Project. The project consists of 162 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.

2.2 Policy statement

SMUD's overarching goal is to provide safe, reliable, environmentally sustainable, and affordable electric service to its local community. To meet this goal, SMUD constructs, maintains, and operates its electric system in a manner that minimizes any risk of catastrophic wildfire posed by its electrical lines and equipment.

2.3 Purpose

This WMP describes the range of activities that SMUD is taking to mitigate and reduce the threat of powerline-ignited wildfires, including its various programs, policies, and procedures. This plan is subject to direct supervision by SMUD's Board of Directors and primary responsibility for its implementation resides with the Chief Operating Officer (COO).

This plan meets or exceeds the requirements of PUC section 8387 for publicly owned electric utilities to prepare a WMP. Table 2 references relevant sections in this document that address each PUC requirement.

Table 2 Plan compliance with Public Utilities Code 8387(b)

PUC 8387 Requirement	Description	Plan Section Number
b (2) (A)	An accounting of the responsibilities of persons responsible for executing the plan.	2.5
b (2) (B)	The objectives of the wildfire mitigation plan.	2.4
b (2) (C)	A description of the preventive strategies and programs to be adopted by the local publicly owned electric utility or electrical cooperative to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks.	3
b (2) (D)	A description of the metrics the local publicly owned electric utility or electrical cooperative plans to use to evaluate the wildfire mitigation plan's performance and the assumptions that underlie the use of those metrics.	9.1
b (2) (E)	A discussion of how the application of previously identified metrics to previous wildfire mitigation plan performances has informed the wildfire mitigation plan.	9.1.1
b (2) (F)	Protocols for disabling reclosers and deenergizing portions of the electrical distribution system that consider the associated impacts on public safety, as well as protocols related to mitigating the public safety impacts of those protocols, including impacts on critical first responders and on health and communication infrastructure.	6.1.1, 7.2
b (2) (G)	Appropriate and feasible procedures for notifying a customer who may be impacted by the deenergizing of electrical lines. The procedures shall consider the need to notify, as a priority, critical first responders, health care facilities and operators of telecommunications infrastructure. The procedures shall direct notification to all public safety offices, critical first responders, health care facilities, and operators of telecommunications infrastructure with premises within the footprint of potential deenergization for a given event.	7.1, 7.2
b (2) (H)	Plans for vegetation management.	6.4
b (2) (I)	Plans for inspections of the local publicly owned electric utility's or electrical cooperative's electrical infrastructure.	6.3
b (2) (J)	A list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks, throughout the local publicly owned electric utility's or electrical cooperative's service territory. The list shall include, but not be limited to both of the following:	4.2
b (2) (J) (i)	Risks and risk drivers associated with design, construction, operation and maintenance of the local publicly owned electric utility's or electrical cooperative's equipment and facilities.	4.2
b (2) (J) (ii)	Particular risks and risk drivers associated with topographic and climatological risk factors throughout the different parts of the local publicly owned electric utility's or electrical cooperative's service territory.	5.2
b (2) (K)	Identification of any geographic area in the local publicly owned electric utility's or electrical cooperative's service territory that is a higher wildfire threat than is identified in a commission fire threat map, and identification of where the commission should expand a high fire threat district based on new information or changes to the environment.	5.2
b (2) (L)	A methodology for identifying and presenting enterprise-wide safety risk and wildfire-related risk.	4.2

PUC 8387 Requirement	Description	Plan Section Number
b (2) (M)	A statement of how the local publicly owned electric utility or electrical cooperative will restore service after a wildfire.	8
b (2) (N)	A description of the processes and procedures the local publicly owned electric utility or electrical cooperative shall use to do all of the following:	
b (2) (N) (i)	Monitor and audit the implementation of the wildfire mitigation plan.	9.2
b (2) (N) (ii)	Identify any deficiencies in the wildfire mitigation plan or its implementation and correct those deficiencies.	9.2.1
b (2) (N) (i5ii)	Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, that are carried out under the plan, other applicable statutes or commission rules.	9.1.1
b (3)	The local publicly owned electric utility or electrical cooperative shall present each wildfire mitigation plan in an appropriately noticed public meeting. The local publicly owned electric utility or electrical cooperative shall accept comments on its wildfire mitigation plan from the public, other local and state agencies and interested parties, and shall verify that the wildfire mitigation plan complies with all applicable rules, regulations, and standards as appropriate.	2.6.2
c	The local publicly owned electric utility or electrical cooperative shall contract with a qualified independent evaluator with experience in assessing the safe operation of electrical infrastructure to review and assess the comprehensiveness of its wildfire mitigation plan. The independent evaluator shall issue a report that shall be made available on the internet web site of the local publicly owned electric utility or electrical cooperative and shall present the report at a public meeting of the local publicly owned electric utility's or electrical cooperative's governing board.	2.6.3

2.4 Objectives

The primary objectives of this WMP are to:

1. 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;
2. Implement a wildfire mitigation plan that embraces safety, prevention, mitigation, and recovery as a central priority for SMUD; and
3. Create a WMP that is consistent with state law and objectives.

SMUD has evaluated prudent and cost-effective improvements to its physical assets, operations and training that will help meet these objectives.

The secondary objective of this WMP is to improve the resiliency of SMUD's line construction standards and practices. As part of developing this plan, SMUD assesses new industry practices and technologies that will reduce the likelihood of an interruption in service and improve restoration time in the event of a service interruption. In addition, SMUD reviews available fire investigation reports for fires throughout California to understand root causes that can be addressed.

This WMP outlines the actions SMUD is taking, including exploring new technologies, to reduce the risk of potential wildfire-causing ignitions associated with SMUD's electrical infrastructure, with the objective of enhancing public safety and improving grid reliability.

This WMP also outlines customer outreach and communication programs for customers that may be impacted in the unlikely event of a wildfire related de-energization. SMUD's long-standing and continued cooperation with local agencies are also outlined.

This WMP provides methodologies to measure the effectiveness of specific wildfire mitigation strategies and how those strategies measurably reduce the risk of catastrophic wildfire. Where a particular action, program component or protocol is determined to be unnecessary or ineffective, SMUD will assess whether a modification or replacement is merited. This plan will also help determine if more cost-effective measures would produce the same or improved results.

2.5 Accountability of the plan

SMUD's Chief Operating Officer has overall responsibility for the WMP. The Chief Operating Officer and Chief Customer Officer are responsible for executing the various components of the WMP.

2.5.1 SMUD operating unit responsibility specific to each component of the plan

Table 3 lists the Director with responsibility for the departments or workgroups that are accountable for the various components of SMUD's WMP. In each case the Director or the Director's designees will be responsible for the accuracy of, and for operations in accordance with, the specified component of the plan.

Table 3 Accountability for the WMP components.

Mitigation Activities	Responsible Department and Workgroup
Risk analysis	Director, Treasury Operations & Risk Management
Fire threat assessment in service area and UARP	Director, Distribution Planning & Operations
Wildfire prevention strategy and programs	
- Disable automatic reclosing - Planned de-energizations	Director, Transmission Planning & Operations, Director, Distribution Planning & Operations
- T&D line patrols - Aerial patrols - 69kV & Transmission line IR inspections - Wood pole intrusive inspection - Splice assessment - Detailed line inspections	Director, Line Assets
- Substation visual inspections	Director, Substation, Telecom & Metering Assets
- Vegetation management - Pole clearing program	Director, Line Assets
Fire mitigation construction	
- Natural Ester-based fluid - Cal FIRE exempt equipment in PCA	Director, Distribution Planning & Operations
- Weather stations	Director, Transmission Planning & Operations
Enhancement projects	
- Install SCADA reclosers in PCA	Director, Distribution Planning & Operations Director, Line Assets
Pilot projects	
- Light Detection and Ranging and Ortho Imagery	Director, Line Assets
Emergency preparedness	
- SMUD Emergency Operations Centers	Director, Facilities, Security & IPPS
- Public and agency communications for wildfires	Director, Customer Operations & Community Energy Services, Director, Customer Experience Delivery, Director, Corporate Communications

2.6 WMP Adoption and submittal

In 2019, SMUD conducted extensive stakeholder outreach during its preparation of the initial WMP. SMUD personnel met with local fire agencies and fire safe councils, Office of Emergency Services, and healthcare organizations. In addition, SMUD invited federal, state, and local agencies, representatives of utilities, telecommunication providers, and critical care customers to attend stakeholder outreach meetings where information regarding the preparation and contents of the WMP were provided.

From 2019 and annually thereafter, SMUD has and will continue to communicate with its community partners and stakeholders regarding its WMP reviews and updates. SMUD posts a public review draft of changes to the WMP on SMUD's website, smud.org/WildfireSafety. Notice of the public review draft is provided to the above stakeholders and published in local newspapers, including the Sacramento Bee and Mountain Democrat, on social media, and through electronic newsletter.

2.6.1 Public comment

A public review draft of changes to the WMP is posted on smud.org/WildfireSafety and made available to the public for comment for a period of at least 30 days after notification in local publications and social media. The public is provided instructions in how to submit comments on the posted web page.

Interested parties are also invited to comment on the plan at the time it is presented to SMUD's Board of Directors.

2.6.2 Board presentation

SMUD Board and Board Committee meetings are open and accessible to the public. Meeting notices and agendas are posted least 72 hours in advance at the SMUD office and on SMUD's website. Those who are unable to attend the meeting in-person can attend via zoom, livestream the meeting, or view a recording on SMUD's website. SMUD offers the opportunity for persons interested in wildfire related matters to sign up to receive notifications any time wildfire is being discussed at an upcoming Board or committee meeting at smud.org/WildfireSafety

Updates to the WMP are presented to and adopted by the Board at a noticed public meeting annually.

2.6.3 Independent evaluation

Although PUC 8387 does not require SMUD to retain a qualified independent evaluator (QIE) on an ongoing basis, we do as part of the comprehensive review process, and we find value in a review when substantial revisions to the WMP are made. In 2019 SMUD issued a public solicitation request, consistent with SMUD's procurement practices, to identify an experienced QIE to assess the comprehensiveness of SMUD's WMP. SMUD contracted with a QIE with experience in assessing the safe operation of electrical infrastructure. SMUD repeated this process in 2020 and again as part of its 2023 triennial comprehensive review and update process. SMUD also retained a QIE to assess its 2022 WMP.

Each QIE report was presented to SMUD's Board of Directors at a noticed public meeting and posted to SMUD's website along with the WMP. The reports concluded SMUD's WMP is comprehensive and meets statutory requirements as well as industry standard.

2.6.4 Wildfire Safety Advisory Board

Each year SMUD submits its WMP to the Wildfire Safety Advisory Board (WSAB). The WSAB reviews and provides comments and advisory opinion regarding the content and sufficiency of the WMP. SMUD will consider comments and opinions received by the WSAB in future documents. These advisory opinions can be found on their web page:

https://energysafety.ca.gov/what-we-do/wildfire-safety-advisory-board/publications/

2.6.5 Budgeting WMP initiatives

SMUD adopts its budget through open and public processes. WMP program commitments reflected in any given budget are impacted by many factors, including risk evaluations, system condition and requirements, emergency occurrences, economy, legislation, environment, and liability exposure. These commitments are consistently under evaluation, and program priorities can change if any of these factors shift.

3 Overview of preventive strategies and programs

This WMP addresses the preventive strategies and programs adopted by SMUD to minimize the risk of its electrical lines and equipment causing a catastrophic wildfire. The strategies and programs included in the WMP are evolving and are subject to change. As new technologies, practices and networks develop, and other environmental influences or risks are identified, changes to address them may be incorporated into future iterations of the WMP which is, in effect, a living document.

This WMP integrates and interfaces with various operating policies and asset management and engineering principles which are subject to change. As appropriate, the current versions of these documents are incorporated either as appendices to this WMP or by reference.

The following is a summary of SMUD's programs and activities that support wildfire prevention and mitigation.

Table 4 Mitigation programs/activities

Design and construction
Ester-based insulating fluid in transformers
Cal FIRE exempt equipment in Pole Clearing Area (PCA)
Light Detection and Ranging (LiDAR) Ortho, Oblique Imagery
Increase overhead wire spacing to reduce wire to wire contact
Pole loading and placement
Transmission line rating remediation
Pole replacement and reinforcement
Wildfire resiliency design
Construction fire prevention program
Substation perimeter fencing
SCADA reclosers in PCA
Inspection and maintenance
Transmission line aerial patrols (helicopter)
Transmission line ground patrols
Transmission line infrared (IR) inspections (helicopter)
Transmission line splice and dead-end termination assessment program
Transmission and distribution wood pole intrusive inspections
Transmission and distribution vegetation right-of-way maintenance
Transmission and distribution annual subject pole clearing program
Distribution detailed line inspections
Distribution line patrols
69 kV and Pole Clearing Area 12 kV IR inspections (helicopter)
Visual inspections of distribution substations
LiDAR/Remote Sensing inspection of transmission for Vegetation Management
Inspection and maintenance programs for T&D lines and substations
IR inspection of energized overhead T&D facilities and equipment
Drive by of overhead distribution facilities and equipment
Detailed inspection of T&D facilities and equipment
Supplemental inspections of high fire risk areas
On-ground routine inspection
Operational practices
Disabling reclosing during fire season
Transmission and distribution system vegetation management maintenance patrols and work (tree pruning & removal) as needed for safety and reliability
Special work procedure for red flag warning (RFW)

De-energization protocols and notifications
Emergency Operations Planning: fire prevention plan
Hotwork procedures
Work procedures and training for persons working in locations and conditions of elevated fire risks
Safety and physical security protection teams
Increased staff for line and vegetation management crews in preparation of storm
Existing relationship with local government and fire safe councils
Transmission encroachment program
Provide liaison to county office of emergency services' (OES) during fire event
Leverage existing relationship with local government and fire departments
Targeted communications plan
Active environmental safety monitoring
SMUD's Emergency Operations Center partners with local emergency responders for coordination prior to and during an emergency
High fire threat district vegetation management inspection strategy (annual)
Inspecting trees with potential strike path to power lines
Expanded subject pole clearing
Expanded clearance distances at time of maintenance (Tier 2 & 3 in HFTD & PCA)
Patrol and pruning/Tree removal, Quality Control
Increased vegetation clearance at time of tree work
Situational/conditional awareness
Weather monitoring stations in targeted areas in the UARP
Coordinate and collaborate with Fire Safe Councils and County Office of Emergency Services throughout the year to prepare for RFW and high fire risk events
Contractor safety training and orientation for transmission and distribution vegetation management work
Monitor daily California Department of Forestry and Fire Protection website and active fires in California
On-site personnel at specific periods
Response and recovery
Planned de-energization during fire season
Critical event communications process and procedures
Strategy for minimizing public safety risk
Emergency response plan
Field operations recovery procedures
Coordinate with neighboring entities

4 Risk analysis and risk drivers

SMUD uses its existing ERM framework to identify and assess enterprise level risks. SMUD's ERM framework takes into consideration both quantitative and qualitative factors to determine the level of inherent and residual risk levels for a particular risk. 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.

4.1 Enterprise risk assessment

The ERM framework has a strong governance structure stemming from SMUD's Board of Director's Strategic Direction and is overseen by an executive body, the Enterprise Risk Oversight Committee (EROC). The framework requires that all enterprise risks be owned by an Executive and managed at the Director level.

The ERM framework includes a 5-step process and is integrated with SMUD's internal audit process to check for assurance of proper control implementation. The framework requires continuous communications and consultation throughout the life of the risk. The 5-step ERM process is shown in Figure 2 which describes the objective of each step.

Figure 2 ERM 5-step process

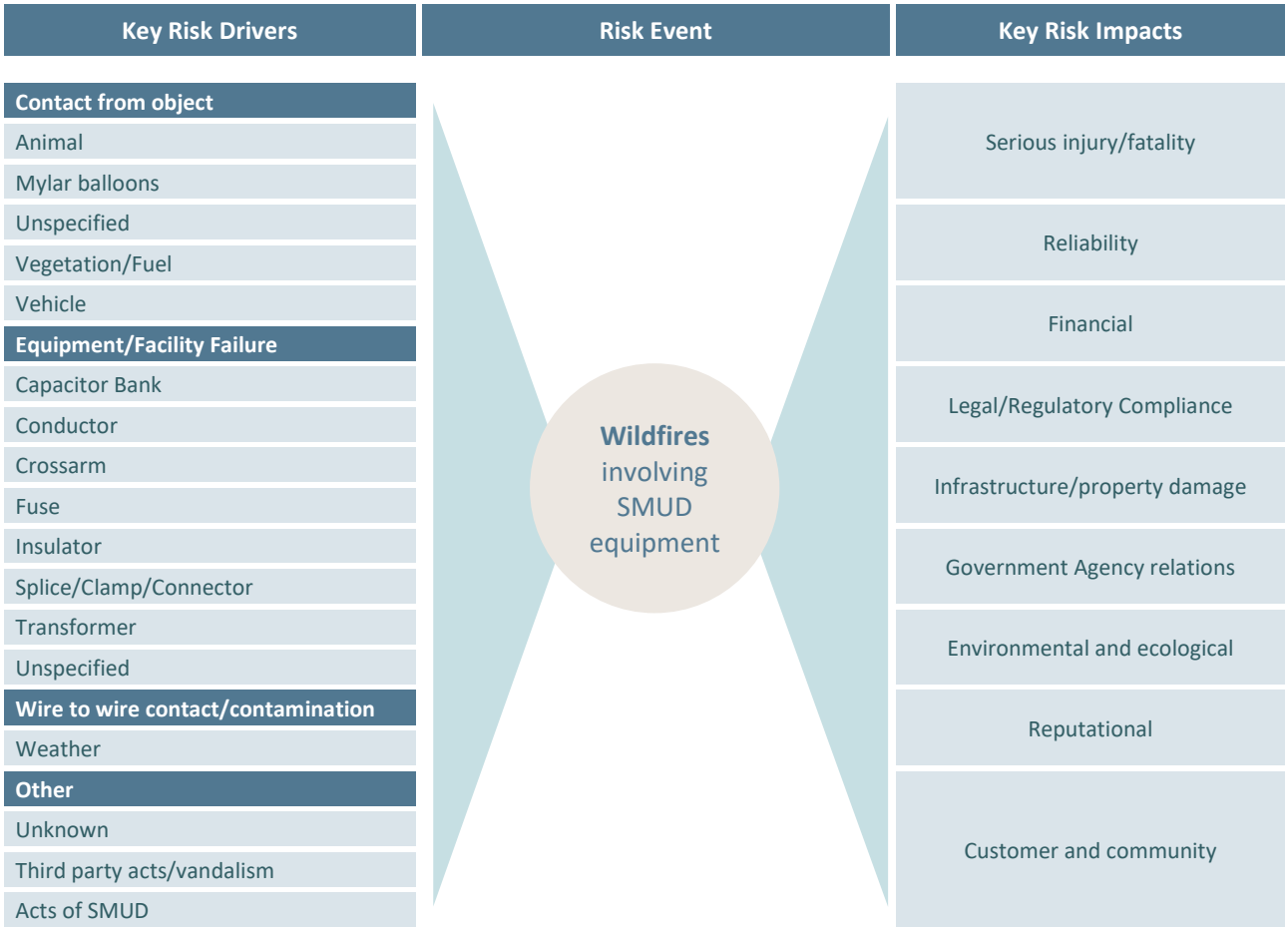
During a risk evaluation, the Director, manager, stakeholders, and subject matter experts (SMEs) are consulted. ERM staff gathers pertinent information to conduct the evaluation which includes a root cause analysis. Information gathered includes key risk drivers, key risk impacts, mitigations, processes, procedures, controls, and internal/external risk trend. SMUD uses a commonly accepted framework called the bow-tie method for its root-cause analysis. This method allows easy visualization of the relationship between the risk event, its drivers, and impacts, as well as preventive and mitigation activities. In addition, the method allows for a structured risk analysis where quantification is not possible or desired. SMUD's ERM framework takes into consideration impacts to SMUD's finances, legal, regulatory and compliance, operations, reputation, public safety, workforce, and environment.

4.2 Enterprise safety and wildfire risk

Following SMUD's ERM assessment process, Subject Matter Experts (SMEs) were consulted in conducting a risk assessment for wildfires which could potentially involve SMUD equipment. The SMEs focused on potential causes of powerline sparks that could start a fire. The risk assessment was conducted to identify SMUD's vulnerabilities, exposure to and impacts from a wildfire as well as to identify current controls and mitigations to prevent wildfire occurrence, likelihood, velocity, and impact.

Figure 3 provides the risk bow tie, which summarizes the assessment process.

Figure 3 SMUD's wildfire risk bow tie. Drivers and impacts are indicators that a risk event could occur, not a reflection of actual or threatened conditions.



4.2.1 Fire risk drivers

Powerline equipment is generally the same across all utilities where a small niche of manufacturers and suppliers are used to procure equipment for construction of facilities. Slight variances in design and construction may be expected between utilities. SMUD staff evaluated other utilities' fire causes and applied its own field experience to determine the potential risk drivers. Four categories were identified as potential for causing powerline sparks and ignitions:

- Contact from objects
- Equipment/facility failure
- Wire-to-wire contact/contamination
- Other

SMUD staff identified the following drivers associated with each category. These are discussed below but may not be limited to the following.

4.2.1.1 Contact from objects

Most overhead powerlines throughout the world are installed as bare wire on top of insulated poles and structures. Overhead powerlines are kept at a certain distance from the ground and from adjacent objects, based on the voltage level and applicable design criteria, to prevent contact and faults. However, with thousands of miles of overhead powerlines, contacts from objects are anticipated by utilities and can occur throughout the year.

Animals and highly conductive mylar balloons are some of the objects that can contact powerlines, resulting in possible sparks and arcs. While protection equipment such as circuit breakers, reclosers and fuses are installed to isolate the faults, there are time delays (within fractions of a second or seconds) associated with when the equipment senses the fault and proceeds to isolate (or "trip") the faulted section. The time delays are instant to the human, but not quite fast enough to prevent all sparks prior to tripping. Emitted sparks, molten metal or burnt foreign objects can fall on -- and potentially ignite -- any fuels underneath or near the powerline.

Vegetation such as trees, branches, palm fronds, etc., from inside and outside of powerline pathways can contact powerlines at any time, also resulting in possible sparks or arcs. Sometimes, the stress of contact is large enough to cause a connector or pole to fail, which will lead to wires falling and touching the ground. In some instances, the tree or branch may continue leaning on the powerline and continue sparking or catch on fire due to resulting sparks.

Additionally, vehicles contacting poles or supporting guy wires can damage or break the pole. The heavy, broken pole in turn can put too much stress on connectors or crossarms and cause wires to break and fall to the ground potentially emitting sparks and arcs.

4.2.1.2 Equipment failure

All man-made equipment fails at some point or another during its life. Failure modes can be discrete (internal) or destructive (materials ejected). Failure components such as hot line clamps, connectors and insulators can result in wire failure and cause the wire to fall to the ground. The energized conductors can emit sparks prior to breaker or fuse tripping/isolating. Transformers and capacitor banks can have internal shorts that can potentially be destructive and eject materials which could create a spark, leading to a fire.

4.2.1.3 Wire-to-wire contact/contamination

When two or more energized conductors contact each other, they will cause sparks and possible material to be ejected. There are many factors that could lead to such an occurrence. Any type of shaking of the pole or high winds may cause the powerlines to sway and touch. A shaking pole can be caused by vehicle contact or

livestock rubbing against a pole or supporting guy wires. Certain types of faults (shorts) down the line can cause powerlines to gallop (bounce and buck).

Contamination on insulators can create a path for electricity to flow. This unintended path can track and cause a fault. Typical causes are ash, dust, debris, and bird excrement on the insulator. These causes can usually be determined by burn marks along the insulator.

4.2.1.4 Other

SMUD's powerlines traverse through many parts of its service territory, including residential properties, along road rights-of-way (ROW), within business parking lots, etc.

Non-SMUD equipment and construction projects could be a possible cause of ignition. Even though property owners and contractors take precautions, their equipment can contact powerlines and cause sparking triggering fires in the vicinity. Although unintentional, these contacts may cause damage to powerlines, poles and supporting equipment which may cause sparks and trigger fires in the vicinity.

SMUD equipment can also be vandalized and damaged, which may cause sparks and fires.

SMUD takes pride in a properly trained and well-informed workforce. Crews perform switching, construction, and maintenance on facilities daily. However, the tools and vehicles they use can be sources of sparks or ignition. For example, driving a truck over dry grass/brush can cause the dry grass/brush to ignite. As such, SMUD trucks are equipped with fire suppression equipment and staff are properly trained to respond to an ignition and the use of the fire suppression equipment.

During Red Flag Warning (RFW) periods in the UARP, crews working in remote sites limit hotwork (such as welding, grinding, cutting etc.) to prevent an ignition. As a precaution, designated staff assigned as a fire-watch, may stay behind after work completion for up to thirty minutes to ensure a fire doesn't start after work crews leave a remote site. SMUD's VM contract crews have on-site fire suppression equipment, ex. fire rake, water backpack and shovels. On remote sites where a masticator is being used, crews have a 200 gallon or greater water tank on hand for fire suppression and perform a one-hour fire watch after work is complete.

4.3 Key risk impacts

If one of the risk drivers listed above were to occur, resulting in a fire ignition or wildfire incident, there could be many potential consequences. The worst-case scenarios could include:

- Personal injuries or fatalities to the public, employees, and contractors
- Damage to public and/or private property
- Damage and loss of SMUD owned facilities and assets
- Impacts to reliability and operations
- Damage claims and litigation costs, as well as fines from governing bodies
- Damage to SMUD's creditworthiness, or increases cost to borrow money or purchase insurance
- Environmental and ecological damage
- Damage to SMUD's reputation and loss of public confidence
- Customer and community impacts
- Financial

4.4 Climate change

The National Aeronautics and Space Administration (NASA) defines climate change as the change in the usual weather conditions and patterns found in a region.[3] 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."[3]

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.[4]

California's most recent, Fourth National Climate Assessment issued in November 2018 says that "climate change is expected to increase the frequency and intensity of wildfires," consistent with many expert predictions that climate change would increase the risk of large and severe wildfires, including a potential increase in the total area burned.[4]

Several climate-related factors have contributed to the increasing risk of wildfires. The severity of wildfires is generally a function of the condition of the combustible vegetation material involved, terrain or setting and weather conditions. Tree stress and mortality, including damage due to insect infestations such as the bark beetle exacerbate fire hazards creating a tinderbox, providing an environment for catastrophic fires. In addition, as air temperatures rise, forests and land are drying out, also increasing fire risks, and creating weather conditions ripe for fire ignition and expansion.

Fire season in much of California has historically extended from early spring through the late fall, due to the dry and hot nature of these months. As a result of the extreme weather conditions and other impacts from climate change as well as the increase in population density and development in the wildland-urban interface (WUI), there's a growing need for year-round fire prevention and preparedness. SMUD's service territory is predominantly developed land, shrubland and grassland, while our Upper American River Project traverses heavily forested areas. These varying land cover types will experience differing climate impacts and, as a result, have unique wildfire mitigation requirements.

4.5 Tabletop exercise

SMUD regularly conducts tabletop exercises (TTXs) to test, analyze and enhance the current level of SMUD's internal and external coordination and expertise in responding to potential wildfire threats related to SMUD's utility system facilities. The TTXs are used to enhance general internal awareness, test SMUD standard emergency operating plans and procedures in the wildfire context, invite collaboration with our public safety partners and community partners, and provide an opportunity to rehearse emergency practices in a simulated environment. The TTX's operational objectives are developed to evaluate SMUD's core response capabilities in three specific areas: (1) wildfire preparedness/mitigation, (2) emergency notification and response, and (3) short-term recovery operations and procedures.

SMUD utilizes the Homeland Security Exercise and Evaluation Program (HSEEP) principles for its exercise program management, exercise design, development, evaluation, and improvement planning processes.

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

Each exercise program provides for analysis of data collected during the exercise as well as feedback obtained from relevant stakeholders to inform improvement planning.

SMUD participates in annual TTXs with internal and external stakeholders, including local fire, law enforcement and emergency services serving communities within the exercise design scenario. Strengths in the following areas have been identified: relationships with local emergency response agencies, coordination between the SMUD EOC and local agencies, information-sharing, and clarity of SMUD's response procedures and WMP. Where appropriate, recommendations for further collaboration and information sharing processes are developed.

4.6 Risk reduction efforts under the WMP

Since the adoption of its initial WMP, SMUD has initiated multiple projects to directly reduce the risk of ignitions from SMUD owned powerlines in the UARP and PCA. Three of those projects concluded in 2021 and 2022. The conclusion of these projects resulted in direct ignition risk reduction in Tier 2 and Tier 3 of HFTD areas. The remaining three risk reduction projects are more than halfway completed.

Working with its contractors SMUD completed a project in 2020 to allow remote de-energization of four 4kV circuits that were overhead at the time. The remote capability allowed Power System Operators to de-energize any or all four circuits during high fire threat weather conditions during fire season. The remote de-energization capability reduced the risk of ignitions in Tier 2 and Tier 3 of HFTD during high fire threat weather conditions. This project addressed risks related to the 4kV circuits while SMUD undertook its project to underground the lines.

After evaluating alternatives, SMUD committed to underground approximately three miles of 4kV lines in Tier 2 and Tier 3 of HFTD in the UARP. This undergrounding project was completed by summer of 2022. Seven hundred feet of bare 4kV overhead conductor remains in the HFTD, all of which is over rocky terrain underbuilt on 60 feet to 80 feet tall 69kV structures, and one span of tree conductor crossing over a river. The risk of ignitions in Tier 2 and Tier 3 of HFTD areas from 4kV distribution lines has been virtually eliminated by undergrounding the three overhead circuits.

SMUD also piloted the use of large drones to take high-resolution images of all transmission structures in the UARP. This pilot project concluded in 2021. The drone allowed taking photos of various powerline components on the entire structure, including the foundations, insulators, hardware, crossarms, and the static line on top. Photographs of the components were taken from various angles and elevations, allowing an almost 360-degree view of the individual components. The high-resolution images were analyzed off-site by third-party desktop inspectors. Deficiencies such as loose or missing palnuts (locknuts), loose nuts, loose or missing cotter pins, chipped/contaminated insulators, bent/damaged cross members, gunshot damage, and others were noted. SMUD staff reviewed and prioritized the deficiencies for field corrections. The most severe deficiencies were corrected immediately, or within six months. Other less severe deficiencies were scheduled for correction based on SMUD's normal repair timeframe. Most of the deficiencies found were items SMUD tower patrolmen normally find during annual visual inspections. However, some deficiencies would not have been discoverable without this technology. This pilot project provided very good feedback to tower patrolmen to focus on certain items during their inspections. This project also documented minimal wear and overall excellent condition of SMUD's UARP transmission lines that are over sixty years old. This project allowed SMUD to reduce the risk of ignition in Tier 2 and Tier 3 of HFTD areas due to hardware failure or worn components.

The Vegetation Management team has a six-year project to remove select incompatible trees, shrubs, and other vegetation within the transmission line corridor plus 200 feet on either side. The fuels reduction project comprises of mastication via use of ground-based equipment (tractors, feller bunchers, skidders, and chainsaws) to fell and extract trees up to 30 inches in diameter breast height or up to 20 inches diameter breast height in wildlife protected activity center; herbicide application on shrubs and invasives in previously masticated areas; and hand thinning and piling in rocky terrain and where slopes exceed 35%, and to protect

sensitive resources such as stream environment zones, archaeological sites, and critical habitat for threatened and endangered species. Mechanical treatments open the forest canopy, increase sunlight, and so increase the productivity and diversity of plants on the forest floor. Mechanical treatment reduces the risk of crown fires by extracting small to intermediate-size trees which carry fire into the forest canopy. Mastication will be used primarily to implement the ladder fuel treatment prescription, targeting woody shrubs and small-diameter trees, leaving a mixed species composition of 80-100 trees per acre. Mastication of shrubs and small trees (up to 11 inches diameter at breast height) will reduce the density of understory fuels and non-commercially sized trees, increasing heterogeneity in stand structure. Mastication converts ladder fuels to surface fuels and enhances decomposition of biomass, allowing prescribed fire to be implemented with greater ease and control by reducing the amount of oxygen within the fuel structure. Reducing fuels in this manner can allow for broader conditions under which prescribed fire may be applied while accounting for a range of ecological features and attributes, such as animal and bird diversity and soil chemical composition. Implementation of hand thinning is informed by design criteria accounting for and minimizing impacts to forest vegetation, soils, and wildlife. This effort began in 2020 and is expected to continue to 2023.

5 SMUD assets fire threat overview

SMUD provides electricity to its customers via substations and T&D line assets. Table 5 provides a high-level description of SMUD's T&D assets.

Table 5 Asset description

Asset Category	Asset Description
Transmission line assets	Assets include conductor and transmission structures operating at or above 115 kV (lines that are tied to generation are considered transmission regardless of operating voltage).
Distribution line assets	Assets include overhead conductor, underground cabling, transformers, voltage regulators, capacitors, switches, line protective devices and street lighting operating at less than 69 kV (all 69 kV lines not tied to generation are considered distribution).
Substation assets	Assets include major equipment such as power transformers, voltage regulators, capacitors, reactors, protective devices, relays, open-air structures, switchgear and control houses.

Table 6 provides an overview of SMUD's T&D assets in CPUC High Fire Threat District (HFTD) tiers by circuit mile and percentage of total.

Table 6. Overview of SMUD's T&D assets in CPUC HFTD tiers

Asset	Total	Outside HFTD		Tier 2		Tier 3	
	Circuit-miles	Circuit-miles	%	Circuit-miles	%	Circuit-miles	%
Total OH transmission	470	326	69%	89	19%	55	12%
12 & 21 kV (Generation tie lines)	<1	<1	0	0	0	<1	<1%
69 kV	38	7	18%	31	81%	0	0%
115 kV	51	51	100%	0	0%	0	0%
230 kV	381	268	70%	58	15%	55	14%
Total OH distribution	3868	3867	100%	<1	<1%	0	0
Total OH T&D circuit-miles	4338	4194	97%	89	2%	55	1%
	Total No.	Outside HFTD		Tier 2		Tier 3	
Total load serving substations	243	243	100%	0	0%	0	0%

Notes:

- All Tier 2 and Tier 3 facilities are in the UARP area, outside of SMUD's electric service area.
- Values rounded to nearest mile

5.1 CPUC high fire threat district (HFTD)

SMUD directly participated in the development of the CPUC's Fire-Threat Map[5], which defines a statewide high fire threat district (HFTD). SMUD has incorporated the HFTD map into its construction, inspection, maintenance, repair, and clearance practices, where applicable.

In the HFTD map development process, SMUD served as a territory lead, and worked with utility staff and local fire and government officials to identify whether any areas within SMUD's service territory are at an elevated or extreme risk of powerline ignited wildfire. It was determined through that process and affirmed by both a peer review and a team of independent nationwide experts led by the California Department of Forestry and Fire Protection (CAL FIRE), that SMUD's service area is properly situated outside the HFTD. Outside of its service area SMUD's UARP facilities are situated within both Tier 2 and Tier 3 of the HFTD. Based on these processes, the existing environment and current information, SMUD believes that the HFTD map appropriately identifies the level of wildfire risk within SMUD's service territory and UARP. SMUD will continue to evaluate factors that may indicate the CPUC should expand the HFTD to include additional areas.

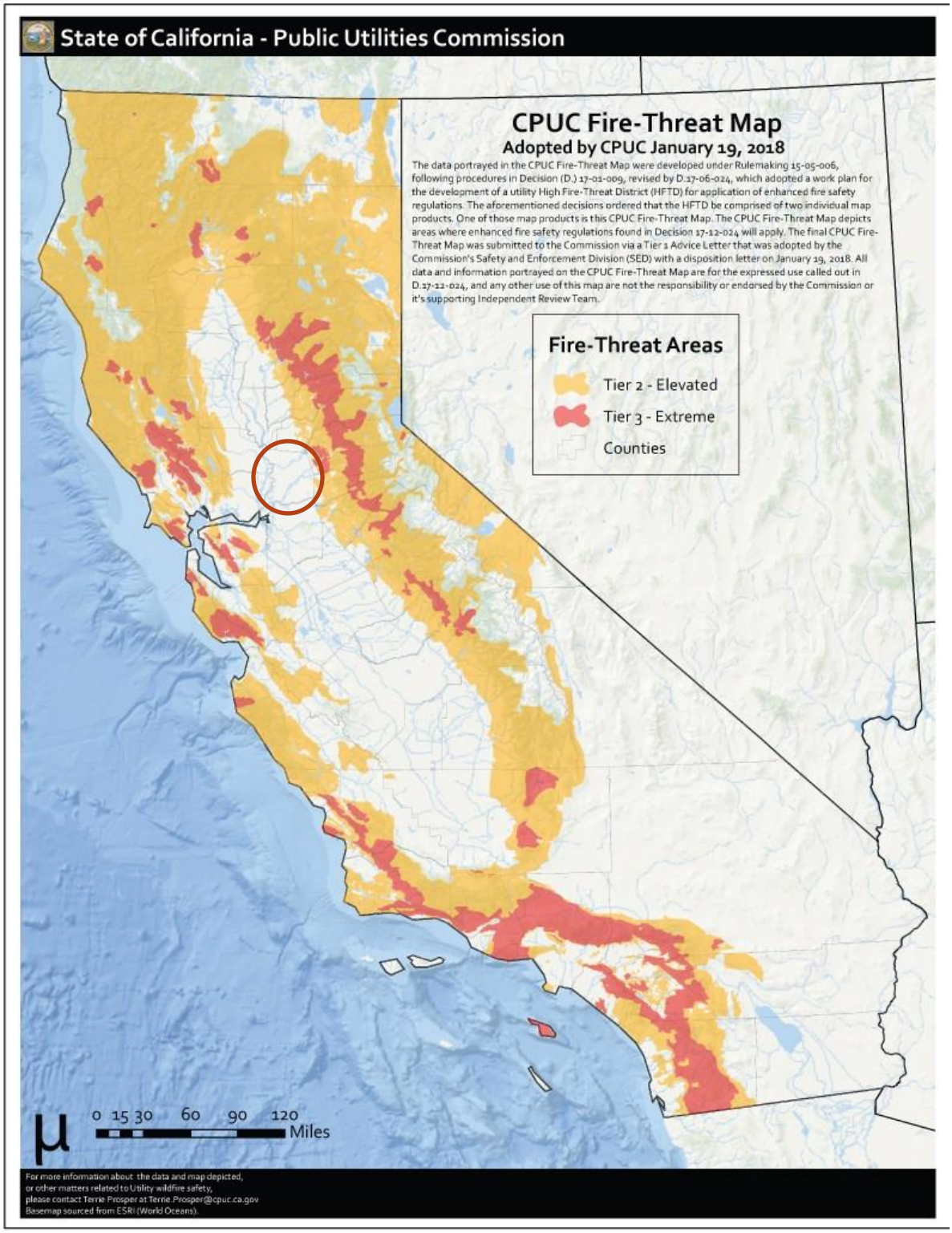
5.2 Fire threat assessment in SMUD service area

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.

The CPUC Fire-Threat map identifies Tier 3, extreme fire risk, Tier 2, elevated fire risk, and areas outside of the HFTD. Figure 4 depicts the CPUC Fire-Threat Map and SMUD's service area location within the map.

[5] Adopted by CPUC Decision 1-12-024.

Figure 4 SMUD's service area within CPUC Fire-Threat Map



SMUD's assets are located both within HFTD areas (including Tier 2 and 3) and areas not deemed within the HFTD (referred to as non-tier or outside HFTD in this document). Approximately 25% of SMUD's overhead circuit-miles of wires are located within the HFTD, with approximately 10% located within Tier 3 ("Extreme Fire Threat"). None of SMUD's distribution substations are located within the HFTD.

5.3 Fire threat assessment in UARP, Western Sierra Nevada Mountain range

SMUD's greatest fire threat risk is in the Western Sierra Nevada Mountain range, where the hydroelectric project known as the "UARP" is located. The project's powerhouses and switchyards are interconnected via multiple 69kV and 230kV transmission lines which traverse through the mountain range through CPUC's HFTD Tier 2 and Tier 3 designated areas. All 230kV circuits and three 69kV circuits are constructed with lattice steel towers between 100 feet and 150 feet tall. One 69kV circuit is constructed with three-to-five pole wooden structures between 60 feet and 80 feet tall.

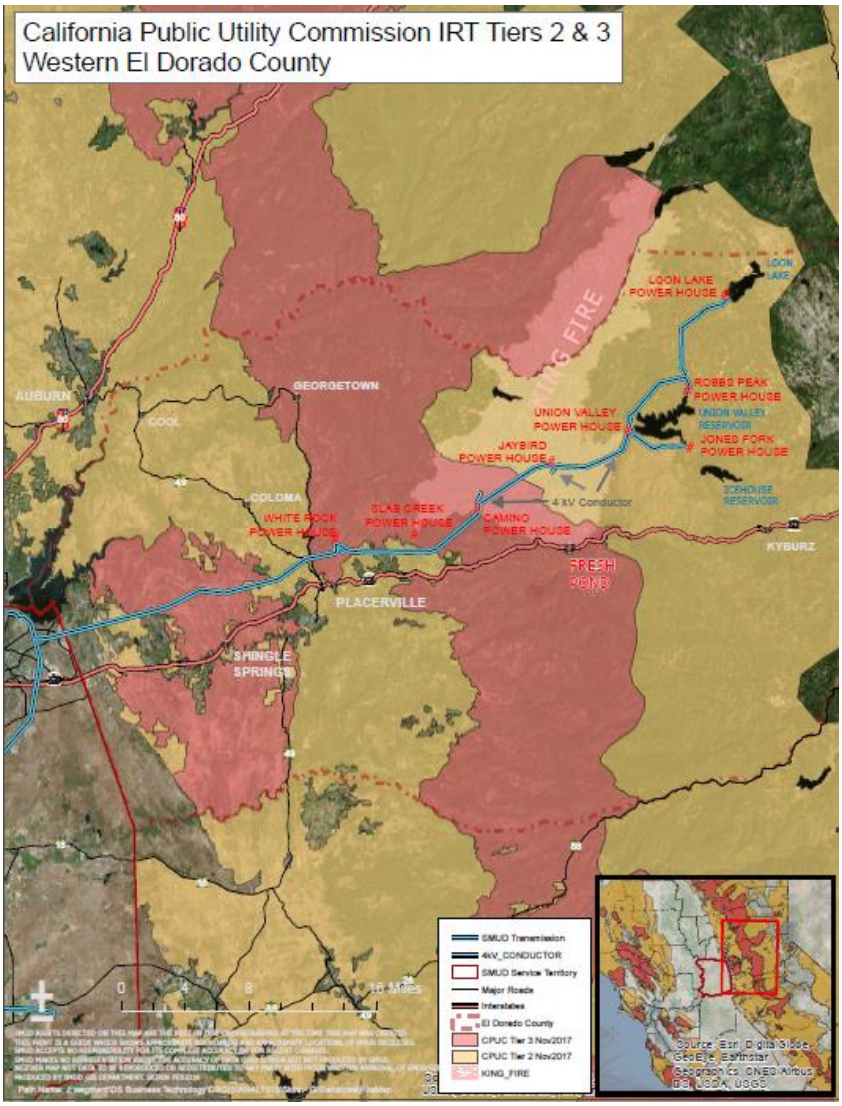
SMUD's UARP is in highly susceptible area to wildfires specifically due to the regional climate that facilitates regular drought conditions, the natural plant communities that produce excess fuel, and the natural and anthropogenic ignition sources. Within the UARP, vegetation adjacent to electrical infrastructure (powerhouses, transmission lines, switchyards, etc.) is a source of fuel. Extended periods of warm temperatures could increase fuels and the possibility of wildfires Greater numbers of diseased and dead trees also increase this possibility.

The most notable recent wildfires are the Caldor Fire in 2021, King Fire in 2014, Freds Fire in 2004, and Cleveland Fire in 1992. The Caldor fire in 2021 did not impact SMUD's transmission lines and powerhouses. The King fire impacted approximately 20 miles of SMUD transmission lines in 2014. 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 King Fire did not substantially damage hydroelectric infrastructure, it 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. SMUD's transmission line Right-Of-Ways acted as fire breaks to help stop the spread of the King fire.

Operation of SMUD's facilities in the UARP have never been associated with the ignition of a wildfire. The King and Caldor Fires demonstrate the high risk of fire in the terrain through which SMUD transmission lines traverse. Continuing drought and climate change continues to exacerbate this risk.

Figure 5 shows the UARP area where all SMUD's assets are located within CPUC Tier 2 and Tier 3.

Figure 5 CPUC Tier 2 and Tier 3 areas for SMUD's UARP



5.4 CAL FIRE Fire Resource and Assessment Program (FRAP)

CAL FIRE publishes multiple maps related to fire threat throughout the state. SMUD refers to the Fire Hazard Severity Zone (FHSZ)[6] map for many years to inform and plan maintenance activities. In November 2022, CAL FIRE published a new State Responsibility Area (SRA) FHSZ map[7] for public review and comment. This map is expected to be finalized in 2023. Additionally, CAL FIRE will publish a new map depicting FHSZ for Local Responsibility Area (LRA) and Federal Responsibility Area (FRA). The new map depicts slight changes in fire hazard severity in the PCA SMUD will incorporate information from the new and future FHSZ maps into SMUD's mitigation programs as needed.

Although SMUD takes CAL FIRE's FHSZ mapping into consideration as part of its wildfire mitigation planning, SMUD's Wildfire Mitigation Plan references the CPUC Fire Threat Map that focuses on the risk of utility associated wildfires[8].

[6] https://egis.fire.ca.gov/FHSZ/
[7] https://osfm.fire.ca.gov/divisions/community-wildfire-preparedness-and-mitigation/wildfire-preparedness/fire-hazard-severity-zones/
[8] https://www.cafirefoundation.org/cms/assets/uploads/2020/05/CPUC_Fire-Threat_Map_final.pdf

6 Wildfire prevention strategy and program

SMUD has a robust set of measures to address potential wildfire risks. The WMP will incorporate existing efforts and identify the process moving forward to supplement them where a need is identified.

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 are 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 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 has explored potential system improvements in certain locations such as the use of non-sparking equipment in key areas (e.g., use of CAL FIRE exempt fuses), replacing wood poles with steel or ductile iron in certain cases and the use of covered conductor alternatives.

SMUD has protocols for disabling automatic reclosing and for de-energizing lines for public safety. Some conditions that factor into these protocols include: RFW, forecasted temperatures above 100°F, winds exceeding design standards and low humidity. It also has an Outage Communications Plan that addresses potential de-energization events. SMUD will include targeted messaging for affected areas that will set expectations and identify support resources. Table 7 describes activities that address SMUD's key wildfire risk factors.

Table 7 Activities that address wildfire risk factors

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 (daily 30 minutes after work completion in high-risk areas)

6.1 Distribution grid operational practices

6.1.1 Disabling reclosing during fire season

SMUD has procedures for the operation of reclosers. For the purposes of those procedures, fire season is defined as:

- May 1 to October 1, or
- RFW in effect for areas inside or immediately surrounding the PCA

SMUD disables automatic reclosing on certain substation and line reclosers that extend into the PCA. In some cases, the line reclosers are completely bypassed with fuses if automatic reclosing cannot be disabled. On circuits where line reclosers are bypassed, the fuses provide protection to the end of the line. Due to climate change, the dry summer season is extending further into the year. Reclosing will remain disabled until the first major rain event in the service territory. See Figure 7 for graphic of the PCA.

6.1.2 Planned de-energization during fire season

During fire season, SMUD has elected to take certain measures to mitigate the risk of wildfires in the PCA, that could potentially migrate to the HFTD areas. When weather conditions that precede wildfires are forecasted and a wildfire threat is imminent, SMUD's Distribution System Operations (DSO) personnel have the authority to de-energize select distribution circuits in the PCA. DSO personnel will use individual or multiple de-energization triggers listed below, as well as power system knowledge and potential community impacts, to make de-energization decisions. This decision requires a balancing of all these factors as well as a knowledge of the area and operation of the power system. No single trigger is determinative. DSO relies on weather data from various sources, including Wunderground.com and SMUD's internal Energy Management System.

Triggers for de-energization of PCA circuits:

- Imminent fire danger
- Customer or community impacts
- A RFW declaration by National Weather Service in effect for areas inside or immediately surrounding the PCA
- Critically dry vegetation that could serve as fuel for a wildfire
- Low humidity levels
- Temperatures over 100ºF
- Winds projected beyond 12kV design criteria (56 mph)
- Mandatory fire orders in effect (as directed by any Agency Incident Commander)
- On-the-ground, real-time observation from SMUD or other agency field staff

SMUD's DSO personnel have the authority to de-energize portions of the distribution grid during emergency conditions when requested by local law enforcement or fire officials. These requests are handled individually, and don't fall under PUC 8387 requirements.

6.2 Transmission grid operational practices

6.2.1 Disabling 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. The disabling of reclosing follows fire season described in 6.1.1

6.2.2 Planned de-energization during fire season

SMUD's Power System Operators (PSO) have the authority to de-energize portions or all the Valley and UARP transmission line(s) for safety, reliability, conditions beyond design criteria, threat of wildfires and during emergency conditions when requested by local law enforcement or fire officials. Per existing protocols, planned de-energizations are coordinated with interconnected agencies.

During active fire season as declared by CAL FIRE the PSO is authorized to de-energize portions or all the Valley and UARP transmission line(s) when there is imminent fire danger, mandatory fire orders are in effect, and/or the transmission system is experiencing conditions beyond design criteria. The PSO will take a combination of many factors into consideration when implementing de-energization procedures, which include the triggers listed below, as well as power system knowledge and potential community impacts. De-energization decisions require a balancing of all these factors as well as a knowledge of the area and operation of the power system. No single element is determinative.

- Extreme fire danger threat levels, as classified by the National Fire Danger Rating System
- A RFW declaration by the National Weather Service
- Low humidity levels lower than what is required for a RFW
- Sustained winds exceeding design standards
- Site-specific conditions such as temperature, terrain, and local climate
- Critically dry vegetation that could serve as fuel for a wildfire
- On-the-ground, real-time observation from SMUD or other agency field staff

The PSO utilizes various operational and situational awareness tools to determine when de-energization is appropriate. The tools are listed below:

- Weather data telemetered into SMUD's Energy Management System, such as wind speed, wind direction, air temperature, barometric pressure and relative humidity
- US Forest Service – Wildland Fire Assessment System, https://www.wfas.net/
- CAL FIRE Incidents Information, https://www.fire.ca.gov/incidents
- CAL FIRE California Statewide Fire Map: https://www.fire.ca.gov/incidents/
- National Weather Service: https://www.weather.gov/
- Indji Watch real time operational tool
- Geographic Information System (GIS) based tools
- ALERTWildfire: http://www.alertwildfire.org/tahoe/index.html
- NOAA/National Weather Service Storm Prediction Center: https://www.spc.noaa.gov/
- National Significant Wildland and Fire Potential Outlook, https://www.predictiveservices.nifc.gov/outlooks/outlooks.htm

6.3 Infrastructure inspections and maintenance

SMUD performs a multitude of time-based inspections on its T&D facilities. A description of the inspections is summarized in the following sections.

6.3.1 Transmission line inspections

SMUD's transmission lines are grouped in two inspection areas. UARP region includes all lines east of Folsom going up to the hydroelectric facilities in the Sierra. The Valley region comprises of all transmission lines in SMUD's service territory.

6.3.1.1 Aerial patrols (helicopter)

SMUD uses helicopters to perform aerial inspections of transmission lines. During these patrols, line inspectors inspect the condition of line structures and attachments, any structural problems and safety hazards, damage to insulators, vibration dampers, hardware, conductors, static shield wires, optical ground wires, signs of hot spots, potential vegetation concerns and tower identification signs (aerial signs).

Aerial patrols are performed twice a year on all lines in the UARP and once a year in the Valley.

6.3.1.2 Ground patrols

Line inspectors use a combination of walking and driving when conducting ground patrols. They visit transmission tower sites to make detailed visual inspections and on occasion they complete IR inspections. The line inspectors utilize binoculars to detect any damage to above ground components. Line inspectors may climb towers identified with severe corrosion or deformation to determine the corrective action required.

Ground patrols are performed annually on all lines in the UARP, and every two years on all lines in the Valley.

6.3.1.3 IR inspections (helicopter)

The line inspectors use IR cameras to inspect transmission lines as part of one of the helicopter patrols. An IR camera is used to identify "hot spots" on current carrying components of the transmission line. Hot spots could be an indication of loose connections that may fail. The images are saved, and written reports are prepared, which document the conditions found. The documentation identifies the location, problem found, date and time of the IR inspection. When the thermographer identifies abnormal conditions, these are reported for investigation and correction as necessary. Items identified are reported and scheduled for correction.

IR inspections are performed annually on all lines in the UARP, and every two years in the Valley.

6.3.1.4 Wood pole intrusive inspections

Intrusive inspections require sample material be taken for analysis, and/or using more sophisticated diagnostic tools beyond visual inspections or instrument reading. Wood poles are subjected to an intrusive inspection to determine and identify problems such as rot and decay. The inspection is performed using a calibrated drill bit that records the resistance and pressure required to drill a fixed diameter hole to a measured depth. The results are produced as a graph on a depth scale which is used to find voids and decay within the pole.

SMUD intrusively inspects wood poles at a minimum cycle of 10 years and a maximum cycle of 14 years.

6.3.1.5 Vegetation right-of-way maintenance

Both line inspectors and VM planners visually inspect the T&D ROW for encroachments, access road conditions and safety hazards. Two traditional helicopter patrols are also conducted annually by certified arborists or registered professional foresters to specifically inspect for vegetation issues that could threaten SMUD facilities. The VM ROW maintenance program's approach is to remove and prune vegetation in the

ROW of incompatible species and to maintain low-growing native and diverse plant communities that are compatible with electrical facilities by using Integrated Vegetation Management (IVM) Wire Zone-Border Zone Management which is the industry standard. This is a long-term approach which supports system reliability through reclaiming the ROW and managing for future workload. This approach allows for ongoing monitoring of vegetation corridors to prevent encroachment into the minimum vegetation clearance distance (MVCD) and ensures SMUD facilities meet or exceed state laws and industry standards.

Traditional (boots on the ground) vegetation ROW inspections are performed annually on all transmission, and distribution lines in the UARP, and regularly one to three years on T&D lines in the Valley.

6.3.1.6 Splice assessment program

This program is designed to assess the integrity of transmission conductor splices. The technology employed by a contractor uses an x-ray machine that encompasses a splice and takes an x-ray image of the splice. Inspectors then evaluate the image to determine the internal condition of the splice. This allows staff to identify splices that are potentially close to failure. A special type of in-line splice connector corrector is installed to strengthen the splice when needed.

6.3.1.7 Aerial photography via UAV with desktop review

SMUD has a new program to uses large drones to capture high-resolution photos of transmission structures. The photos are reviewed separately offline by the contractor and SMUD's trained personnel. The high-resolution photos allow the reviewer to zoom-in and identify deficiencies that are not possible to identify during traditional inspection methods. The reviewer can identify loose or degrading hardware including cotter keys, improper splice installation, loose fiber optic or ground wire attachments, stressed/chipped/tracked insulators, foundation problems, bullets lodged in conductors, etc. The photos are taken from multiple angles and elevations allowing in-depth review and confirmation of deficiencies. Identified deficiencies are scheduled for correction as needed.

Aerial photography with desktop review will be performed once for all structures, and a cycle will be established after.

6.3.2 Distribution line inspections

SMUD performs various inspections on distribution lines to ensure safety, reliability, and consistency with standards in California Public Utility Commission (CPUC) General Order (GO) 95, GO 128 and GO 165.

6.3.2.1 Detailed line inspections

Line inspectors use a combination of walking and driving when conducting detailed line inspections (DLIs). They visit each SMUD pole to make detailed visual inspections. The line inspectors utilize binoculars to detect damage to above ground components attached to the pole. The inspectors look for broken or loose hardware; mechanical damage to any component; condition of guy wires and anchors; condition of insulators and conductors; condition of disconnects and fuse holders; condition of risers and conduits; condition of transformers, reclosers and cap banks. Ground conductors, moldings, signs, and other minor hardware is also inspected. Similar inspections are performed on pad-mounted equipment and equipment installed below grade in vaults or building basements. Identified deficiencies are scheduled for correction as needed.

DLIs are performed every five years on all overhead distribution equipment and pad-mounted equipment, and every three years on underground equipment.

6.3.2.2 Line patrols

Line patrollers patrol their designated service area and track their progress with a GIS enabled visualization tool. The use of the tool ensures that all devices within SMUD's service territory are patrolled. The patrollers

are looking for obvious signs of defects, structural damages, broken hardware, sagging lines and vegetation clearance issues. Identified deficiencies are scheduled for correction as needed.

Line patrols are performed annually on all distribution lines and equipment.

6.3.2.3 69 kV and Pole Clearing Area 12 kV IR inspections (helicopter)

SMUD performs helicopter IR inspections on 69 kV circuits in the Valley and 12 kV circuits within the PCA. See section 6.3.1.3 for additional description.

69 kV and PCA 12 kV IR inspections are performed every other year in the Valley.

6.3.2.4 Wood pole intrusive inspections

Distribution wood pole intrusive inspections follow the same criteria as transmission wood poles intrusive inspections. See section 6.3.1.4.

6.3.2.5 Annual pole clearing program

The pole clearing program is an annual requirement to clear vegetation around poles in the PCA that have certain CAL FIRE non-exempt equipment on them. This program follows California Public Resource Code 4292. The code calls for clearing vegetation within a 10-foot radius of a pole or tower on which non-exempt equipment is attached, unless such pole or tower meets certain criteria that makes it exempt from the clearance requirements. SMUD contracts this activity out for completion prior to May 15th of each year.

6.3.3 Distribution substation inspections

SMUD performs various inspections on substations to ensure safety and reliability. SMUD inspections meet or exceed standards in CPUC GO 174.

6.3.3.1 Visual inspections

Substation inspectors visit each SMUD substation to visually inspect the facility and all equipment within. The inspectors look for broken or loose hardware; vandalism or damage to any equipment; oil or gas leaks; perimeter fence security; condition of the buss, insulators, and other hardware; condition of the control house; conditions of the poles/structures and lines exiting the substation; condition of the disconnects and fuses for signs of damage and connectivity. Deficiencies are noted and scheduled for correction as needed.

Visual inspections are performed at least 10 times per year.

6.4 Vegetation management

SMUD's VM program is responsible for the patrol, work plans and quality control (QC) audits of the actual tree work for the transmission and distribution system in the Valley, as well as the transmission and distribution system in the UARP. These activities are performed year-round to maintain compliance with applicable Federal Facilities Design, Connections and Maintenance (FAC) 003-5 and State regulations, including Public Resources Codes section 4292 and 4293; and incorporate the standards in CPUC GO 95 Rule 35.

6.4.1 Distribution system vegetation management

SMUD performs routine traditional vegetation maintenance, such as pruning and removal, on a time-based interval. This interval consists of one, two, and three-year ground-based field patrols. The field patrols are ground based inspections of tree and conductor clearances and hazard tree identification. The results of the patrols are targeted areas for vegetation pruning or removal.

SMUD hires contracted Line Clearance Qualified tree contractors to complete the identified annual vegetation work (pruning and removal) needed to ensure public safety and electric reliability as well as reduce wildfire risk in SMUD's service territory. During the tree work, the contractor aims to achieve up to 15 feet of

clearance in local responsibility areas within SMUD's Service Area and 30+ feet of clearance in the HFTD (Tiers 2 and 3) at time of tree work, unless otherwise directed by SMUD VM staff. The contractor also clears vegetation from SMUD's secondary voltage, service drops and pole climbing space on an as needed basis. SMUD's contractors follow American National Standards Institute (ANSI) A300 concepts and utility directional pruning, which supports proper pruning/tree health while achieving and maximizing the work cycle.

6.4.2 Transmission system vegetation management

SMUD VM planners perform traditional annual ground-based field patrols to ensure compliance with state and federal regulatory requirements (Public Resource Code 4293) and alignment with standards in CPUC GO 95 Rule 35 and FAC 003-5. The field patrols are traditional, ground-based inspections of tree and conductor clearances and hazard tree identification. The results of the patrols are targeted areas for vegetation pruning or removal. Additionally, SMUD completes two annual aerial patrols in El Dorado County to address the ongoing challenge of tree mortality due to drought and various insect vectors.

SMUD hires contracted Line Clearance Qualified tree contractors to complete the identified annual vegetation work (pruning and removal) needed to ensure public safety and electric reliability as well as reduce wildfire risk.

During the tree work, the contractor follows the planner's prescription (scope of work) to achieve the desired safety clearance. SMUD's contractors follow ANSI A300 concepts and utility directional pruning, which supports proper pruning/tree health while achieving and maximizing the pruning cycle. Additionally, SMUD's transmission VM program aligns with ANSI A300 Part 7 IVM standard.

6.5 Fire mitigation construction

6.5.1 Ester-based insulating fluid in transformers

Natural ester-based insulating fluids are derived from renewable vegetable oils – providing improved fire safety, transformer life/load ability and environmental benefits that are superior to mineral oil and unsurpassed by any other dielectric coolant. SMUD began purchasing and installing pad mounted and pole mounted transformers with ester-based fluid in 2004. All new distribution transformers installed since 2004 and moving forward contain ester based insulating fluid. This includes replacements for old transformers and new installations.

6.5.2 Non-expulsion equipment in PCA

SMUD has identified additional targeted wildfire mitigation measures for the PCA. A capital program is in place and scheduled to replace all expulsion type equipment. SMUD may have to replace poles, lines or equipment as ongoing activities. For this reason, SMUD crews will also install non-expulsion equipment (CAL FIRE exempt equipment) as part of any construction activity in the PCA.

6.5.3 Weather stations

SMUD has 14 weather stations within its service territory and UARP, eight are in the Sacramento Metropolitan area and six in the UARP. Of the six in the UARP, four weather stations are positioned on towers located within the HFTD to support SMUD's de-energization procedures. Data from weather stations installed in SMUD's service territory and UARP assist in the real-time monitoring of weather conditions for situational awareness and to help inform implementation of mitigation measures such as de-energization of transmission lines.

6.5.4 Covered conductor and Ductile Iron poles

A new generator tie line was required to interconnect a new small hydro generator to PG&E's distribution system in the UARP. This opportunity was used to pilot the installation of covered conductor installed on ductile iron poles. This line is the first of its kind in SMUD's experience and has provided valuable information

to SMUD engineering and construction staff. This information can be used to identify other potential locations for use of covered conductor solutions.

6.6 Enhancement and mitigation projects

SMUD forecasts and plans for upcoming work several years in advance. This planning process allows adequate level of staffing and funding for needed projects. This section identifies the specific upcoming projects that help reduce SMUD's wildfire risk.

6.6.1 Install non-expulsion devices in PCA

Start date: 2020
Expected completion: 2025

This project targets SMUD's PCA to reduce the risk of fire ignitions by installing non-expulsion equipment (CAL FIRE exempt equipment[9]). Existing overhead fuses and fuse holders will be replaced with non-expulsion type fuses. Existing arresters will be replaced with new arrestors that have arc protection. In addition, the connectors used to attach the devices to conductors will be replaced with Cal FIRE exempt wedge-type connectors.

6.6.2 Replace #6 Copper conductors in PCA

Start Date: 2021
Expected Completion: 2023

This project targets SMUD's PCA for removal of #6 copper conductors and replacement with heavier gauge aluminum. The project was proposed in conjunction with Eagle Take Permit mitigation work to reduce avian contacts issued in connection with the expansion of SMUD's Wind Farm in Solano County. The mitigation activity involves re-framing approximately 185 poles to increase overhead conductor spacing.

6.6.3 UARP 4kV UG conversion

Start Date: 2020
Completed: 2022

After performing a feasibility study of alternatives, SMUD decided to remove the 4kV bare wire lines in the UARP and install underground infrastructure. Two of the shorter lines were undergrounded in 2020 and 2021. Construction was completed on the longest of the three lines in summer of 2022.

6.6.4 UARP Fuels Reduction

Start Date: 2019
Expected Completion: 2023

This project is designed to help protect the UARP transmission lines and strengthen the fire break value it provides. The project area includes the entire length of SMUD's UARP transmission line within the existing right-of-way corridor plus approximately 200 feet on each side. Project treatments are designed to increase the area of forest lands treated for fuels reduction and prescribed fire and contribute to the longer-term restoration of the Crystal Basin forested landscape. Implementation measures will reduce the density of surface and ladder fuels by mechanical thinning, mastication, and hand crew work as part of a larger suite of silvicultural prescriptions that restore mixed conifer composition, health, and vigor. The project seeks to establish conditions that allow for a mosaic of multiple age class forest stands, variation in tree size, density,

[9] Additional Information: https://osfm.fire.ca.gov/media/8482/fppguidepdf126.pdf

and species composition through treatments that retain the largest trees while establishing conditions that allow for safe and efficient fire suppression, especially around private inholdings of Sierra foothill communities.

6.6.5 Install SCADA reclosers in PCA

Start Date: 2024
Expected Completion: 2026

The existing 12kV feeders serving PCA customers are non-SCADA. This project will install SCADA enabled reclosers on feeders that serves SMUD's PCA customers. The SCADA reclosers will provide distribution operators visibility to the circuits and ability to operate the recloser remotely, including remotely disabling the reclosing function. The SCADA enabled reclosers will have modern microprocessor-based controllers, which will provide SMUD engineers the flexibility of fast-trip settings during fire season, and normal settings for improved reliability during storm season. Visibility to circuit's measured values will provide distribution operators the ability to remotely de-energize the circuit(s) when conditions warrant or when requested by emergency response personnel.

6.7 Pilot projects

Pilot projects are initiated to explore technologies and practices that are new to SMUD. These projects are intended for SMUD staff to evaluate the effectiveness and benefits of the technologies or practices. The pilot must prove successful to implement the technology or practice. Some of the factors considered at the conclusion of a pilot are proven risk reductions, material and installation costs, ease and efficiency of installations and overall effectiveness of the technology. Based on the results of the pilots, SMUD may elect to integrate the technologies or practices into its various ongoing maintenance programs. Current pilot projects are described below.

6.7.1 VM Aerial LiDAR,[10] ortho and oblique imagery

Start Date: 2017
Expected Completion: As needed

SMUD contracted with an external vendor to utilize LiDAR and remote sensing to supplement or enhance traditional "boots on the ground" vegetation patrols. Both LiDAR and Ortho imagery is obtained from rotary and fixed wing aircraft. The technology measures vegetation clearance distances from the conductor in both "as flown" and modeled conditions. Modeling is taking all the engineering calculations for maximum load and wind ratings to calculate clearance distances in "full operating range of the respective facility." Ortho Imagery is used to provide a more accurate and pre-mature visibility of vegetation in decline that may not yet be visible to the human eye.

The vendor captured LiDAR data along the transmission corridors in the UARP, as well as the portions of Sacramento County designated as CAL FIRE's State Responsibility Area (SRA) for both T&D circuits. The LiDAR detections are categorized by priority. As soon as SMUD VM receives notification, SMUD VM field checks within 2-3 business days, and most within the same day data is received). Urgent and future potential conflicts are field checked and tree work prescribed as needed within 2-4 weeks of obtaining the data. Additionally, longer range detection conflicts are prioritized and incorporated into routine annual patrols

[10] Additional Information: https://www.neonscience.org/lidar-basics

(Transmission & SRA Distribution). These are reviewed by SMUD VM planners during annual patrols and tree work prescribed as required.

6.8 Emerging Technologies

SMUD recognizes that numerous emerging technologies are developing and may play a role in building the resiliency of the system. SMUD will continue to monitor available technologies in future WMPs.

6.9 Workforce Training

SMUD has work rules and complementary training programs for its workforce to help reduce the likelihood of the ignition of wildfires. In summary:

SMUD Line workers complete a 4-year apprenticeship with over 7,500 hours of on-the-job training, in-class, hands-on, and eLearning training. Beyond the carefully documented and tracked on-the-job training Line worker Apprentices also participate in 2 weeks of Initial Field Training, a 24 week Cold / Hot School, and annual safety / regulatory bundled training. All training programs include a mix of classroom and hands-on training. Each Apprentice is held accountable to their training and progress is measured through a step test system that includes a written and hands-on / practical test every six months.

In addition, all new SMUD Line workers receive a 1.5-hour hands-on Fire Safety training during Initial Field Training. This training consists of 30 minutes classroom training that covers hazards, hot work near power poles and off-road activities, red flag warnings, preparedness, fire extinguishers, and more. The training also includes about 60 minutes of hands-on training using fire extinguishers. In addition, all SMUD Line workers receive a 30–60-minute Fire Safety training every two years. This training includes classroom and hands-on training. SMUD also offers a 30-minute Fire Safety eLearning module that can be offered when the hands-on training is not feasible.

For work occurring in the UARP, all employees and contractors receive wildfire prevention, mitigation, and response training prior to the start of work. This includes compliance requirements for SMUD's Hot Work Standard and Eldorado National Forest's Project Activity Level fire prevention and mitigation measures.

7 Response Guidelines

7.1 Emergency Preparedness and Response

As a publicly owned utility, SMUD has planning, communication and coordination obligations pursuant to the California Standardized Emergency Management System (SEMS) Regulations adopted in accordance with Government Code section 8607. The SEMS Regulations specify roles, responsibilities, and structures of communications at five different levels: field response, local government, operational area, regional and state. SMUD has adopted SEMS and other local, state, and federal emergency management doctrine into its comprehensive Emergency Operations Plan (EOP). The EOP identifies wildfire as a major risk in accordance with this Wildfire Mitigation Plan. Pursuant to this structure, SMUD regularly coordinates and communicates with the relevant safety agencies as well as other relevant local and state agencies, as a peer partner.

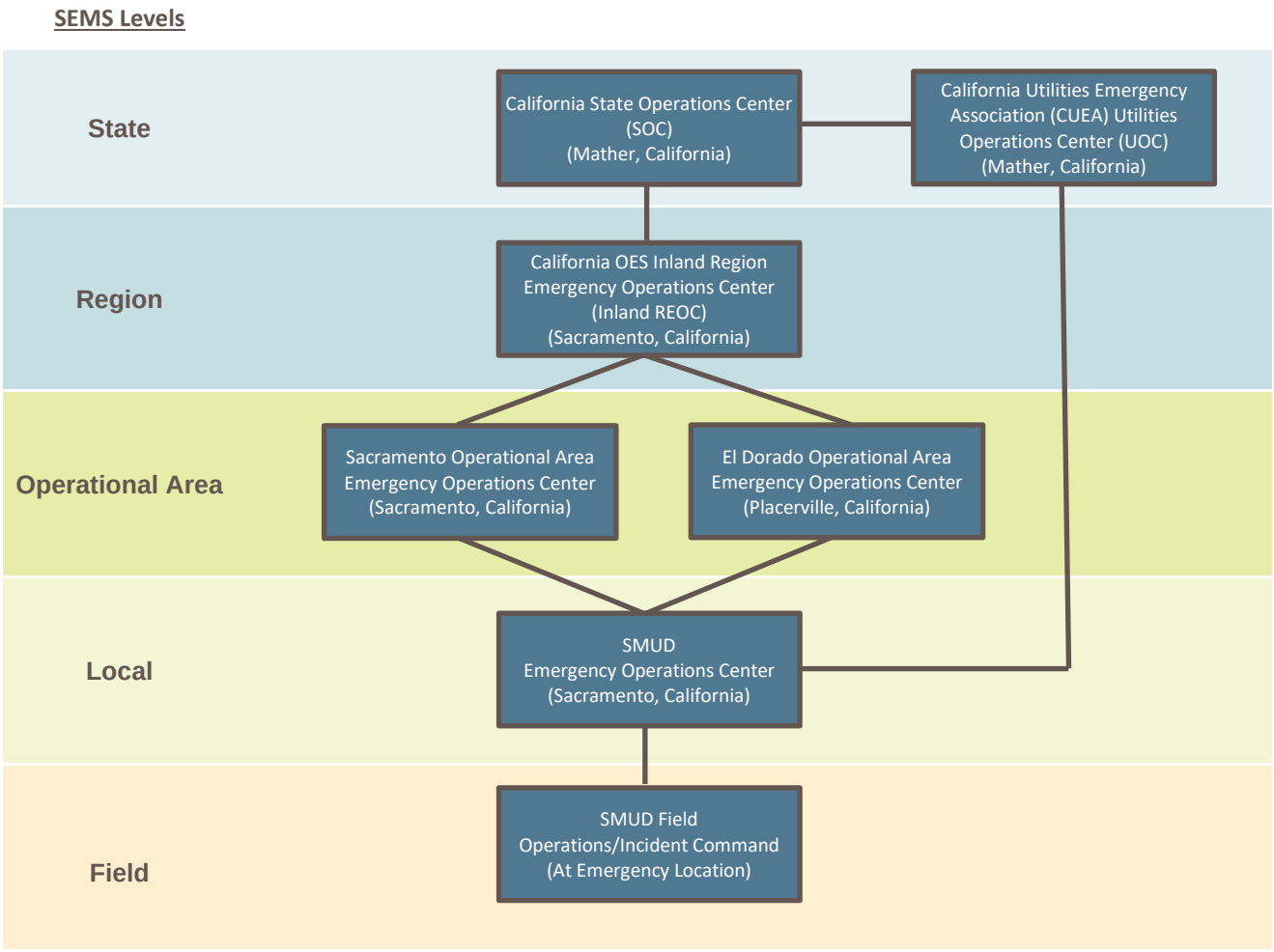
SMUD interacts with emergency response agencies on a peer-to-peer relationship. As part of SMUD's response to a storm, fire, rotating outage, black start events, etc., SMUD collaborates with the local Office of Emergency Services (OES) and provides an agency representative (liaison) to the county (and/or city) Emergency Operations Centers (EOC) to ensure appropriate communication and coordination. Our two primary coordination points for wildfire-related coordination are Sacramento County OES and El Dorado County Sheriff's Office OES (for the UARP region). Additionally, SMUD maintains good relationships with Yolo (gas pipeline), Placer (service territory and UARP), Solano (Wind Farm) and Yuba (Camp Far West) counties.

Upon notification of potential proactive de-energizations or rotating outage events due to wildfire concerns, Emergency Preparedness (EP) staff will coordinate with the appropriate County OES to ensure that all first and emergency response organizations are notified of the de-energization and estimated restoration time (if known). In addition, during a highly localized event, EP Staff will directly notify first and emergency responder jurisdictions of the de-energization/outage.

SMUD EP staff also invite counties to send agency representatives into SMUD's EOC. These representatives can include personnel from the following organizations: City of Sacramento Fire Department, Sacramento Metropolitan Fire District, City of Folsom Fire Department, local cities, Sacramento County OES, the National Weather Service and other local critical infrastructure agencies, ensuring coordination for our service territory.

Additionally, SMUD EP staff serve as SMUD's utility representatives when requested by the California Governor's OES (CalOES) at the California State Operations Center (SOC) for the California Utilities Emergency Association (CUEA), providing a direct link for critical infrastructure coordination to the SOC.

Figure 6 Standardized emergency management system (SEMS) emergency operations coordination



7.2 Public and agency communications for a potential wildfire

Public safety is a guiding principle at SMUD. De-energizing powerlines may be the safest approach and makes sense if the risk of a wildfire starting and spreading is severe. While SMUD's WMP activities are designed to mitigate wildfire danger, in instances of high fire threat conditions, interruption of electrical service by de-energizing powerlines may be necessary as a last resort. SMUD proactively communicates with customers and key stakeholders through multiple channels about preparing for potential power outages, and the power restoration process. SMUD recognizes that many entities and individuals are particularly vulnerable during extended power outages and makes every effort to provide up-to-date information to these populations prior to, during and after an event.

This proactive communication is utilized for:

1) A wildfire threat to localized circuits within the SMUD service territory that results in localized de-energization.
2) A wildfire threat to SMUD's UARP hydroelectric generation and transmission system that results in a de-energization event causing a capacity/energy shortage (rotating outages).

3) A wildfire threat to a major shared transmission line(s) that impacts the statewide grid or parts of it and creates a resource shortage for the utilities, including SMUD, that rely on the resources the line(s) provides.

SMUD has implemented an opt-in program on smud.org that allows for vulnerable populations to receive additional information or notifications in the unlikely event of a wildfire in SMUD service territory.

Among SMUD's vulnerable customers are those enrolled in the Medical Equipment Discount Rate program (MED rate). These customers rely on specialized medical equipment. SMUD also has a Vulnerable Customer program which allows customers to self-identify as vulnerable for concerns not covered by our MED Rate. SMUD has more than 11,300 customers who rely on specialized medical equipment and who are enrolled in the MED rate program or enrolled in our Vulnerable customer program. SMUD will send these customers an email or letter each year to remind them of the risk of wildfire danger, to have an emergency back-up plan if an outage occurs and refer them to www.smud.org/WildfireSafety for more information.

All SMUD customers can visit the smud.org/wildfiresafety webpage where they'll be able to find:

- Wildfire mitigation plan
- Information on how SMUD mitigates fire risk
- Emergency preparedness tips guide (7 languages)
- Links to additional resources
- Video on wildfire mitigation efforts
- Rotating outage map and periodic event updates
- Frequently Asked Questions on the de-energization process

Smud.org/WildfireSafety provides access to information about SMUD's effort in wildfire planning and prevention (including an archive of this and prior WMPs), how to identify fire risk in areas where SMUD maintains electric facilities, a video on our wildfire mitigation efforts, emergency planning and preparation (in six different languages) and SMUD's de-energization protocols.

SMUD also proactively communicates before potential emergency events about our efforts to prepare for and reduce wildfire risk.

In advance of peak wildfire season, SMUD conducts ongoing communications about how to prepare for emergencies in the event of a wildfire, natural disaster or major outage. The communications include:

- Letters and emails to MED Rate, Senior ID and vulnerable customers, with preparation checklists.
- Outdoor billboards
- Digital monitors in our customer lobby
- Bill inserts
- Reminders on SMUD.org homepage encouraging customers to update contact information
- Customer newsletters (print and email) on safety tips, preparation.

SMUD's public information specialists will provide ongoing updates on multiple platforms, including social media, to provide customers and the community with up-to-date information about an emergency or potential emergency.

SMUD's government affairs representatives will reach out to the executive staff of local governments, elected officials, SMUD's state delegation, federal and tribe representatives and appropriate agency staff to provide initial contact and ongoing communications by email and phone with messages for their constituents.

In the time leading up to a potential or imminent de-energization event or emergency, SMUD makes every effort to maintain contact with customers it believes may be impacted and keep the media, local agencies and the public aware of the number of customers affected and SMUD's activities and restoration efforts.

Key stakeholders and public safety partners, including potentially impacted federal, state, and local elected officials, City and County executive staff, tribe representatives and first responders are also contacted via a variety of channels. SMUD has specific personnel assigned to elected officials and agencies, and to critical customers including water and telecommunications utilities potentially affected by de-energized powerlines.

7.2.1 Event communications

Whenever possible, SMUD will provide potentially impacted customers with notice before implementing any de-energization action, using all available channels to reach customers and other stakeholders with outage information. Sudden onset of emergency conditions could impact SMUD's ability to provide advanced notice to customers.

SMUD sends automated pre-recorded phone calls to customers in the impacted areas/neighborhoods advising when the outage is called and directs them to smud.org/outages for up-to-date information. SMUD.org is updated with features to further enhance customer communications before and during de-energization events.

The SMUD Contact Center's Interactive Voice Response (IVR) will have real-time recorded information informing each group of customers that may be impacted before the de-energizations begin. Messages will be customized and updated as needed for each specific event.

7.2.2 Public safety partners, government agencies, tribes, and critical infrastructure providers

De-energization is a last resort to maintain public and customer safety during extreme fire risk conditions. If extreme fire danger resulted in de-energization or planned rotating outages, SMUD will provide proactive communications to alert key stakeholders and essential service providers and provide as much notice as possible to minimize the impact on our customers and community.

The following customer categories are considered essential and/or critical service providers:

- Jurisdictions providing essential fire, police and prison services
- Government agencies essential to national defense
- Hospitals, assisted living and skilled nursing facilities
- Communication utilities, as they relate to public health, welfare and security, including telephone utilities
- Radio and television broadcasting stations used for broadcasting emergency messages, instruction, and other public information related to the electric curtailment emergency
- Water and sewage treatment utilities identified as necessary for services such as firefighting

SMUD interacts regularly with executive staffs, elected officials, other government representatives and key critical infrastructure customers to keep them updated on its wildfire mitigation efforts. SMUD also works closely with staff members in various departments of regional and local governments, public utilities, nonprofits and other service providers on collaborative strategies and partnership opportunities.

Examples of SMUD's communication and engagement initiatives include:

- Regular in-person briefings with federal, state, and local elected officials and key staff on wildfire risk mitigation and other utility-related issues with comprehensive "leave-behind" materials.
- Meetings with regional and local government staff and elected officials focused on individual districts, communities and neighborhoods and mitigation opportunities.

- Regular in-person and/or digital communication with critical facilities and key customers through SMUD Strategic Account Advisors.
- Interagency projects, collaborative staff training efforts and regular communication with first responders and essential service providers.
- Cross-SMUD participation with the El Dorado County Wildfire Mitigation Stakeholder Group and at other El Dorado County government, public and community meetings.
- Ongoing communication, collaboration and support for local Fire Safe Councils and other fire prevention agencies and nonprofits.

8 Restoration of service

If a transmission or distribution line has been de-energized in anticipation of a wildfire threat, SMUD troubleshooters or patrollers must perform multiple steps prior to re-energization. In an event of a wildfire where distribution poles or transmission structures were burned, additional steps must be taken to rebuild the lines.

8.1 Steps to restoration of service

SMUD work crews must take several important steps prior to restoring electrical service after a de-energization event.

- **Patrol.** SMUD crews patrol the line to look for vegetation in lines and any obvious damage that may prevent safe energization. Depending on the length of the lines, and number of circuits, the patrols can take a several hours to days to complete.
- **Repair.** During patrol, crews look for potential damage to the lines and poles. Where equipment damage is found, additional crews are dispatched with new materials to repair or replace damaged equipment. In some cases, VM crews may be called in to help clear an area of downed trees or branches that have fallen into the power lines while it was de-energized.
- **Test.** Once the lines and poles are safe to operate, crews test the infrastructure by closing the fuse, or breaker to re-energize the line segment.
- **Restore.** Power is restored and the outage communication system provides notification of power restoration to customers.

8.2 Reconstruction after a wildfire

When infrastructure is damaged during a wildfire event, a lot of work is required to plan and execute the rebuilding effort. After local police and fire officials have given SMUD clearance, SMUD work crews can proceed with the assessment and rebuilding effort.

- **Assessment**. SMUD crews must patrol each line segment to determine the extent of damage that has occurred. The patrol involves assessing equipment damage, access issues, any cleanup/debris removal issues and determining personal protective equipment requirements for the crews. SMUD works with the local agency in charge of the fire to access impacted areas as soon as the area is deemed safe by fire officials. During this phase the VM team assesses vegetation damaged by the wildfire that could impact SMUD's facilities.
- **Planning.** After the initial assessment, SMUD supervisors, managers and engineers meet to plan the restoration. The team will work with system operations to prioritize the restoration efforts, targeting the circuits that serve the most critical infrastructure needs.
- **Mobilize.** Based on the size and complexity of the rebuild/restoration efforts, SMUD will coordinate the crews and material needs internally if possible. Mutual aid and contractors may be used on an "as needed" basis to provide additional support. VM crews will begin clearing the ROW and any dangerous trees that pose a threat to the restoration crews. SMUD maintains a critical material vendor list and has contracts it can draw on for labor and material needs; though in an instance of widespread catastrophic damage, necessary materials and labor could experience shortages that may delay work.
- **Rebuild.** The rebuild effort lead by SMUD will commence as soon as areas become safe and accessible. The lines will be rebuilt with a mix of temporary and/or permanent structures as determined during planning. The initial efforts will be to get the lines up and restore the damaged circuits. Depending on the extent of damage, demolition may be performed concurrently or after crews start installing new facilities. SMUD will incorporate new materials and technologies as indicated and available.

- **Restore.** SMUD, mutual aid, or contract crews will restore electric services to our customers as soon as possible after the wildfire. Depending on the extent of damages, customers may have to perform repairs on their facilities and pass inspections by local agencies prior to having full electric service restored. These are coordinated on an as needed basis.

9 Performance metrics and monitoring

This section identifies SMUD's management responsibilities for overseeing this WMP and includes the operating departments and teams responsible for carrying out the various activities described in the previous chapters. This section also identifies the metrics which are used to monitor and audit the effectiveness of this WMP.

9.1 Effectiveness of the WMP

In the initial WMP, SMUD staff identified metrics that met the criteria of PUC 8387. These identified metrics were general in nature. Since those initial metric criteria were identified, the wildfire planning process has continued to develop, and SMUD has received independent evaluation of its WMP. In response to the industry's maturing understanding of wildfire metrics and recommendations received, SMUD undertook a multi-step effort to identify new metrics that can better gauge the success of its many programs and mitigation activities outlined in the WMP.

The first step in this multi-step effort was to assess, identify and establish useful metrics that best measure the activities related to minimizing the probability that SMUD's transmission and distribution system may be the origin or contributing source for the ignition of a wildfire. Metrics identified in this section are measures of quantitative assessment that will be used for assessing, comparing, and tracking performance of the programs and efforts identified in this WMP. This step was completed and reflected in the metrics identified in this WMP.

The second step is to define the benchmarks associated with the metrics. The purpose of these benchmarks is to establish criteria to measure performance of the various activities. Some activities can be measured with specific units of work that are forecasted at the beginning of a year, such as quantities of inspected units etc. Progress towards these forecasted units would indicate on- or off-track completion cadence, which can be adjusted as needed during the year. Other metrics are identified to count uncontrollable units that indicate performance of the grid, such as outage event counts or number of corrective action findings. Development of these benchmarks will require several years of data to determine trendlines and averages. Data collection for the new metrics began in 2021. Following existing practices, SMUD anticipates five years of data will be required to establish the benchmarks, with a target period in 2026.

The third and final step is to determine or define the percentage reduction targets against the benchmarks. Percent reductions against benchmarks would need to be realistic, and not easily achievable. SMUD anticipates the initial benchmarks would require fine adjustments periodically to ensure continued effort towards risk reduction activities. These benchmarks and adjustments will be reflected in SMUD's annual WMP updates.

9.1.1 Metrics and assumptions for measuring WMP performance

SMUD will track the following metrics to measure the performance of this WMP, and its effectiveness in reducing catastrophic wildfire. These new set of metrics are more granular and targeted towards specific maintenance activities that can more closely be tied to performance of the WMP.

Work is identified in annual work plans authorized on an executive level, and work that remains incomplete will be flagged in future work plans. Work may be field-verified and open work notifications are regularly reviewed to allow management to prioritize work in accordance with current risks. SMUD's target is always to complete 100 percent of the work within the initially scheduled time frame. However, emergencies or other unforeseen contingencies can occur that require material and labor resources to be otherwise assigned. In this instance delayed work will be prioritized in following time periods. All work is completed within time periods to allow for the safe and reliable operation of the electric system in accordance with applicable requirements and industry standards.

The Inspection Program Performance metrics shown in Table 8 are based on inspection activities for targeted areas. These are key performance indicators (KPI) based metrics, with specific targets for completion within a year.

Table 8 Inspection Program Performance

Inspection Program Performance (KPI)	Target
Number of circuit miles inspected from Visual Patrol, Distribution Primary, PCA	>=95%
Number of poles inspected from DLI, Distribution, PCA	>=95%
Number of poles inspected from DLI, Distribution, UARP (HFTD Tiers 2 & 3)	>=95%
Number of structures inspected from Patrol, Transmission, PCA	>=95%
Number of structures inspected from Patrol, Transmission, HFTD Tier 2	>=95%
Number of structures inspected from Patrol, Transmission, HFTD Tier 3	>=95%
Percentage of circuit miles inspected for vegetation compliance, Distribution, PCA	>=95%
Percentage of circuit miles inspected for vegetation compliance, Distribution, HFTD Tier 2	>=95%
Percentage of circuit miles inspected for vegetation compliance, Distribution, HFTD Tier 3	>=95%
Percentage of circuit miles inspected for vegetation compliance, Transmission, PCA	>=95%
Percentage of circuit miles inspected for vegetation compliance, Transmission, HFTD Tier 2	>=95%
Percentage of circuit miles inspected for vegetation compliance, Transmission, HFTD Tier 3	>=95%
Number of aerial Flight Patrols, Visual, Valley	1
Number of aerial Flight Patrols, Visual, UARP	2
Number of aerial Flight Patrols, Infrared, Valley	1
Number of aerial Flight Patrols, Infrared, UARP	1
Number of aerial Flight Patrols, 69kV, Infrared, Valley	1
Number of aerial Flight Patrols, 12kV, Infrared, PCA	1
VM Quality Control for Transmission, Sacramento County	>=95%
VM Quality Control for Transmission, UARP	>=95%
Number of trees trimmed or removed, normal activities, PCA	>=95%
Number of trees trimmed or removed, normal activities, UARP	>=95%
Number of poles cleared/treated before start of fire season, PCA	>=95%

9.1.2 Outcome Metrics

Two sets of outcome metrics were identified that measure performance of the grid. These metrics replace the more general "ignition events" identified in previous WMPs, which couldn't directly be tied to risk categories. The outcome metrics shown in Table 9 are consistent with GO95 Rule 18[11] repair priority levels.

Table 9 Grid Condition Findings

Grid Condition Findings (Non-KPI)
Number of GO95 Rule 18 Level 1 findings, Distribution, PCA
Number of GO95 Rule 18 Level 1 findings, Distribution, HFTD Tier 2
Number of GO95 Rule 18 Level 1 findings, Distribution, HFTD Tier 3
Number of GO95 Rule 18 Level 1 findings, Transmission, PCA
Number of GO95 Rule 18 Level 1 findings, Transmission, HFTD Tier 2
Number of GO95 Rule 18 Level 1 findings, Transmission, HFTD Tier 3
Number of GO95 Rule 18 Level 2 findings, Distribution, PCA
Number of GO95 Rule 18 Level 2 findings, Distribution, HFTD Tier 2
Number of GO95 Rule 18 Level 2 findings, Distribution, HFTD Tier 3
Number of GO95 Rule 18 Level 2 findings, Transmission, PCA
Number of GO95 Rule 18 Level 2 findings, Transmission, HFTD Tier 2
Number of GO95 Rule 18 Level 2 findings, Transmission, HFTD Tier 3
Number of GO95 Rule 18 Level 3 findings, Distribution, PCA
Number of GO95 Rule 18 Level 3 findings, Distribution, HFTD Tier 2
Number of GO95 Rule 18 Level 3 findings, Distribution, HFTD Tier 3
Number of GO95 Rule 18 Level 3 findings, Transmission, PCA
Number of GO95 Rule 18 Level 3 findings, Transmission, HFTD Tier 2
Number of GO95 Rule 18 Level 3 findings, Transmission, HFTD Tier 3

The second set of outcome metrics are a measure of the ignition drivers during fire season, shown in Table 10.

Table 10 Drivers of Ignitions

Drivers of Ignitions, fire season only (Non-KPI)
Number of wire downs, inside PCA
Number of Overhead Outage Events caused by animals, inside PCA
Number of Overhead Outage Events caused by foreign material, inside PCA
Number of Overhead Outage Events caused by Vegetation - Tree Preventable, inside PCA
Number of Overhead Outage Events caused by Vegetation - Tree Non-Preventable, inside PCA

[11] https://ia.cpuc.ca.gov/gos/Resmajor/DesNo09-08-029/GO95/DesNo09-08-029-Rule%2018.htm.

9.1.3 Enhancement Projects

Once a project or program is approved, it is planned for execution based on the upcoming year's work schedule. The targets listed here for the approved projects are monitored via milestone achievements.

Table 11 System enhancement capital project performance

Project (KPI)	Target
Number of poles completed, PCA, Hardware Replacement	>=95%
Circuit feet completed, PCA, #6CU Reconductor	>=95%
Units of trees pruned or removed, Wildfire Mitigation Vegetation Management work, UARP	>=95%
Number of SCADA reclosers installed, PCA	>=95%

9.1.4 Community Outreach Measures

SMUD reaches out to customers, local communities, and government agencies for multiple programs. Metrics were developed specific to wildfire mitigation efforts and communication. The various type of community outreach measures is shown in Table 12.

Table 12 Community Outreach Programs

Community Outreach Programs (non-KPI)
Number of contacts with Federal, State and Local Govt offices, specific to wildfire or de-energization related contacts
Number of mailers sent to customers related to Wildfire Mitigation Activities, Email, MED rate
Number of mailers sent to customers related to Wildfire Mitigation Activities, Email, Senior ID
Number of mailers sent to customers related to Wildfire Mitigation Activities, Direct Mail, MED rate
Number of mailers sent to customers related to Wildfire Mitigation Activities, Direct Mail, Customer Connection

9.2 Monitoring and auditing of the WMP

The WMP will be reviewed annually. This annual review will align with SMUD's existing business planning process. This review will include an assessment of the WMP programs and performance.
SMUD's business planning process includes budgeting and strategic planning for a 3-5-year planning horizon.

9.2.1 Identify deficiencies in the WMP

At any point in time when deficiencies are identified, the COO or their delegates are responsible for correcting the deficiencies.

9.2.2 Written processes and procedures

The operational areas conduct their work according to written processes and procedures. Processes and procedures are developed with contributions by specific teams and updated when a need arises. Having written processes and procedures provides for consistency in the execution of programs and activities while enabling employee safety.

9.2.3 Monitor and audit the effectiveness of inspections

SMUD has existing quality control processes embedded into its existing general practice. However, for certain programs, there is a formal quality control process. The following depicts a few of these programs.

9.2.3.1 Distribution system inspections

SMUD's maintenance planning group manages T&D line and substation assets. A key component in managing assets is the development of comprehensive inspection and maintenance programs. The maintenance planning group develops inspection and maintenance programs driven by the need to ensure the safe operation of T&D line and substation facilities, reduce risk of power-related wildfire, meet federal and state regulatory requirements, achieve reliability performance within mandated limits and optimize capital and operations & maintenance (O&M) investments. In addition, this group regularly monitors inspection and corrective maintenance records, as well as diagnostic test results to adjust maintenance plans and develop new programs. SMUD uses best industry practices in developing its maintenance plans.

SMUD's inspection and maintenance programs focus on the following objectives:

- Ensure employee and public safety
- Minimize risk of wildfire posed by power lines and equipment
- Maintain regulatory and SMUD policy compliance
- Improve the availability and reliability of the system
- Employ industry best practices
- Extend the useful life of equipment
- Minimize the total cost of equipment ownership

The maintenance planning group develops and issues annual inspection work plans during the last quarter of the current year for the following year, which are maintained in SMUD's Enterprise Asset Management (EAM) system.

SMUD's Grid Assets Department is responsible for performing the inspections and corrective maintenance. When deficiencies in SMUD facilities are identified, corrective maintenance notifications are created in SAP. The priority for corrective maintenance is to remove safety hazards immediately and repair deficiencies according to the type of deficiency, severity and HFTD tiers. Inspection notifications are monitored throughout the year to ensure timely completion via regular internal reports using SAP data. Enterprise applications are used to deploy, visualize, and validate work based on business rules. These applications provide the visibility and monitoring of work required to make informed decisions and to achieve compliance with our inspection and maintenance programs.

9.2.3.2 Vegetation management (VM)

SMUD's vegetation pruning/removal activities are performed by contractors. The contractors are quality audited by SMUD (VM) personnel. Distribution system related work and contractors are field audited and approximately 7% of the tree work (pruning and removal) is reviewed. This quality assurance (QA) effort is tracked to monitor program effectiveness and overall tree work performance. For transmission, SMUD VM staff perform a quality control (QC) audit of 100% of the transmission system related maintenance work performed by the contractor. For both T&D QC efforts all deficiencies are reissued to the contractor management team and corrective action is required.

9.2.4 Internal audit

SMUD's internal audit department, known as Audit and Quality Services (AQS) provides independent, objective assurance and consulting services to the Board of Directors and management designed to add value and improve SMUD's operations. The AQS mission is to enhance and protect organizational value by providing risk-based and objective assurance advice and insight.

The work of AQS provides reasonable assurance regarding the achievement of objectives in the following areas:

- Adherence to plans, policies and procedures

- Compliance with applicable laws and regulations
- Effectiveness and application of administrative and financial controls
- Effectiveness and efficiency of operations
- Reliability of data
- Safeguarding assets
- Accuracy of the SD monitoring reports

As part of AQS' process to develop its annual audit plan, AQS considers all enterprise risks and performs audits over a selection of processes across electric T&D as well as substation assets on a periodic basis.

10 Appendix

This section contains supporting information to the document.

10.1 Definitions

Distribution System Operations (DSO): SMUD's DSO personnel is responsible for directing the safe and reliable operation of SMUD's distribution system while operating within current policies and procedures during normal and emergency situations. Distribution system operators prepare, check, and administer the execution of safe and reliable switching procedures. DSO will monitor and maintain equipment loading levels to prevent damage to equipment. This group is also responsible for updating outage information timely and accurately so that information can be provided to internal and external customers.

Fire Hazard[12]: "Hazard" is based on the physical conditions that give a likelihood that an area will burn over a 30 to 50-year period without considering modifications such as fuel reduction efforts.

Fire Risk[1]: "Risk" is the potential damage a fire can do to the area under existing conditions, including any modifications such as defensible space, irrigation and sprinklers and ignition resistant building construction which can reduce fire risk. Risk considers the susceptibility of what is being protected.

Hardening: Modifications to electric infrastructure to reduce the likelihood of ignition and improve the survivability of electrical assets.

High Fire Threat District (HFTD)[13]: The HFTD identifies areas of elevated and extreme fire risk related to electric utility facilities. These areas are reflected in a map adopted by the CPUC after an extensive public process. It is a composite of two maps:

1. Tier 1 High Hazard Zones (HHZs) on the U.S. Forest Service - CAL FIRE joint map of Tree Mortality HHZs ("Tree Mortality HHZ Map"). Tier 1 HHZs are zones in direct proximity to communities, roads, and utility lines and are a direct threat to public safety.
2. Tier 2 and Tier 3 fire-threat areas on the CPUC Fire-Threat Map. Tier 2 fire-threat areas depict areas where there is an elevated risk (including likelihood and potential impacts on people and property) from utility associated wildfires. Tier 3 fire-threat areas depict areas where there is an extreme risk (including likelihood and potential impacts on people and property) from utility associated wildfires.

Pole Clearing Area (PCA): SMUD defined area where poles with non-exempt equipment have annual vegetation clearing and/or pruning within a 10-foot radius in compliance with PRC 4292 prior to the start of fire season, currently May 1 of each year. The custom defined PCA boundary includes SRA boundary and adjacent areas with similar vegetation, and portions of a Local Responsibility Area (LRA) in the southern part of Sacramento County. This boundary area exceeds the current SRA boundary due to similar vegetation and risk of ignition. Overhead electrical facilities crossing into and within the boundary of the PCA fall under special operating conditions and fall under enhanced maintenance programs.

Power System Operations (PSO): SMUD's PSO personnel analyze, direct, monitor, control and/or operate SMUD's gas pipelines and electric generation and transmission systems and associated facilities in a safe, reliable, and efficient manner during routine and emergency situations. This position has the responsibility and authority to support and implement real-time actions.

Red Flag Warning (RFW)[14]: A term used by fire-weather forecasters to call attention to limited weather conditions of particular importance that may result in extreme burning conditions. It is issued when it is an on-

[12] Source: http://www.fire.ca.gov/fire_protection/downloads/siege/2007/Overview_Glossary.pdf
[13] Source: http://www.cpuc.ca.gov/FireThreatMaps/
[14] Source: https://w1.weather.gov/glossary/index.php?word=red+flag+warning

going event, or the fire weather forecaster has a high degree of confidence that Red Flag criteria will occur within 24 hours of issuance. Red Flag criteria occurs whenever a geographical area has been in a dry spell for a week or two, or for a shorter period, if before spring green-up or after fall color, and the National Fire Danger Rating System (NFDRS) is high to extreme and the following forecast weather parameters are forecasted to be met:

- A sustained wind average 15 mph or greater
- Relative humidity less than or equal to 25 percent; and
- A temperature of greater than 75 degrees F

In some states, dry lightning and unstable air are criteria. A Fire Weather Watch may be issued prior to the RFW.

State Responsibility Area (SRA)[1]: "The California Board of Forestry and Fire Protection classify areas in which the primary financial responsibility for preventing and suppressing fires is that of the state. California Department of Forestry (CDF) has SRA responsibility for the protection of over 31 million acres of California's privately-owned wildlands."

Transmission and Distribution (T&D): At SMUD, for line maintenance purposes, the transmission system includes 230 kV, 115 kV, and dedicated 12 kV, 21 kV and 69 kV lines tying generation facilities to bulk or transmission substations. The distribution system includes 69 kV, 21 kV, 12 kV, and 4 kV lines serving distribution substations and customers.

Wildfire[15]: An unplanned, unwanted fire in an area in which development is essentially non-existent, except for roads, railroads, powerlines, and similar transportation facilities and structures, if any, are widely scattered ("wildland"), including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.

10.2 References

- CPUC Fire Threat Map, https://www.cafirefoundation.org/cms/assets/uploads/2020/05/CPUC_Fire-Threat_Map_final.pdf
- Public Utilities Code, Chapter 6. Wildfire Mitigation [8387], http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=8387&lawCode=PUC
- County Maps of Fire Hazard Severity Zones in SRA, https://osfm.fire.ca.gov/divisions/community-wildfire-preparedness-and-mitigation/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/
- General Order 95[16] contains rules for the design, construction, maintenance, inspection, repair, and replacement of overhead utility lines. http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K464/209464026.pdf
- General Order 165[16], Inspection Requirements for Electric Distribution and Transmission Facilities. http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K552/209552704.pdf
- General Order 166[16], Standards for Operation, Reliability and Safety During Emergencies and Disasters http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K451/209451792.pdf
- General Order 174[16], Rules for Electric Utility Substations http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M031/K879/31879476.PDF
- Power Line Fire Prevention Field Guide https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildfire-prevention-engineering/prevention-field-guides/

[15] Source: https://www.nwcg.gov/term/glossary/wildfire
[16] SMUD is not subject to CPUC jurisdiction, but has developed design standards, and maintenance programs that meet or exceed the standards in GO 95, GO 128, GO 165, GO 166, and GO 174.

10.3 Acronym glossary

AAM (After-Action Meeting)

AAR (After-Action Report)

AB (Assembly Bill)

AEU (Amador-El Dorado Unit)

AI (Artificial Intelligence)

ANSI (American National Standards Institute)

AQS (Audit and Quality Services)

CAISO (California Independent System Operator)

CAL FIRE (California Department of Forestry and Fire Protection)

CalOES (California Governor's Office of Emergency Services)

CDF (California Department of Forestry)

COO (Chief Operating Officer)

CPUC (California Public Utilities Commission)

CUEA (California Utilities Emergency Association)

DLI (Detailed Line Inspections)

DSO (Distribution System Operations)

EAM (Enterprise Asset Management)

EOC (Emergency Operations Center)

EOP (Emergency Operations Plan)

EP (Emergency Preparedness)

ERM (Enterprise Risk Management)

EROC (Enterprise Risk Oversight Committee)

FAC (Facilities Design, Connections and Maintenance)

FHSZ (Fire Hazard Severity Zone)

FRAP (Fire Resource and Assessment Program)

GHG (Greenhouse gas)

GIS (Geographic Information System)

GO (General Order)

HFTD (High Fire Threat Districts)

HHZ (High Hazard Zone)

HSEEP (Homeland Security Exercise and Evaluation Program)

ID (Identification)

IOU (Investor-owned Utility)

IP (Improvement Plan)

IR (Infrared)

IVM (Integrated Vegetation Management)

IVR (Interactive Voice Response)

kV (Kilovolt)

kWH (Kilowatt Hours)

LIDAR (Light Detection and Ranging)

LRA (Local Responsible Area)

MED (Medical Equipment Discount)

MVCD (minimum vegetation clearance distance)

MW (Mega Watts)

NASA (National Aeronautics and Space Administration)

NFDRS (National Fire Danger Rating System)

O&M (Operations & Maintenance)

OES (Office of Emergency Services')

PCA (Pole Clearing Area)

PG&E (Pacific Gas & Electric)

PRC (Public Resources Code)

PSO (Power System Operations)

PSPS (Public Safety Power Shutoff)

PUC (Public Utilities Code)

QA (Quality Assurance)

QC (Quality Control)

QIE (Qualified Independent Evaluator)

RFW (Red Flag Warning)

ROW (rights-of-way)

SAP (Systems Applications and Products)

SB (Senate Bill)

SD (Strategic Direction)

SEMS (Standardized Emergency Management System)

SME (Subject Matter Expert)

SOC (State Operations Center)

SRA (State Responsibility Area)

T&D (Transmission and Distribution)

TTX (Tabletop Exercise)

UARP (Upper American River Project)

VM (Vegetation Management)

WAPA (Western Area Power Administration)

WMP (Wildfire Mitigation Plan)

WSAB (Wildfire Safety Advisory Board)

WUI (Wildland-Urban Interface)

10.4 Reference for SMUD plans

10.4.1 SMUD's Pole Clearing Area Map

Figure 7 SMUD's Pole Clearing Area with respect to SMUD's service area boundary