



2021 Wildfire Mitigation Plan Independent Evaluation

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1. WMP Independent Evaluation

1.1 Executive Summary

In order to address the escalation of devastating wildfires in the state, California's legislature enacted Senate Bill (SB) 901. This 2019 legislation amends Public Utility Code (PUC) 8387 and mandates that all Publicly Owned Utilities (POUs) develop and submit a Wildfire Mitigation Plan (WMP) by January 1, 2020, and annually thereafter. PUC 8387(a) requires "Each local publicly owned electric utility and electrical cooperative shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of wildfire posed by those electrical lines and equipment."

In 2019, Assembly Bill (AB) 1054 promulgated the creation of the California Wildfire Safety Advisory Board (WSAB). This seven-member board is tasked with reviewing and advising on the content and adequacy of each WMP. Additionally, AB 1054 requires each POU to submit its WMP to the WSAB by July 1st of each year, and to comprehensively revise its plan at least once every three years. SMUD's initial plan, which was drafted in-house by SMUD staff, was adopted by SMUD's Board of Directors on October 17, 2019.

PUC Section 8387(3)(c) requires all WMPs to be reviewed by a qualified independent evaluator with experience in assessing the safe operation of electrical infrastructure. This WMP was reviewed by BKI Engineering Services in November of 2020 for compliance with current PUC code (PUC 8387(b)), which establishes guidelines for the comprehensiveness of POU WMPs. This independent evaluation will review each plan element criterion and determine if they are met by the WMP provided by SMUD.

1.2 Evaluator Qualifications (PUC 8387(c))

Over the past 35 years, BKI has performed numerous electrical system planning studies, electric distribution, transmission and substation design projects for public power utilities in Oregon, Washington, California and Idaho. Since its founding, BKI has worked exclusively with Municipalities, Rural Electric Cooperatives, Rural Electric Association's and Public/People's Utility Districts who have been the core of our customer base. BKI has a well-established history of bringing outstanding qualifications, specialized experience and technical competence to all the projects we have performed over our many years of serving public power.

Past utility wildfire mitigation projects include drafting full WMPs, WMP independent evaluations and wildfire readiness assessments.

1.3 Required WMP Elements

The elements contained in Figure 1 are the basis for all California POU WMPs and must be addressed within the plans. To determine the comprehensiveness of the SMUD WMP, each element will be analyzed with respect to the intent of the code as well as industry best management practices for wildfire mitigation, system hardening and general system resilience.

PUC § 8387 (b)	DESCRIPTION	PLAN SECTION
(2) (A)	An accounting of the responsibilities of persons responsible for executing the plan.	9.1.1, 9.4.1
(2) (B)	The objectives of the wildfire mitigation plan.	1.3, 2.5
(2) (C)	A description of the preventative 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, 4.2
(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.	9.2.1
(2) (E)	A discussion of how the application of previously identified metrics to previous wildfire mitigation plan performances has informed the wildfire mitigation plan.	9.2.1
(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, 6.1.2, 6.2.1, 7.2
(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.	7.1, 7.2, 7.2.1, 7.2.2
(2) (H)	Plans for vegetation management.	6.4, 6.4.1, 6.4.2
(2) (I)	Plans for inspections of the local publicly owned electric utility's or electrical cooperative's electrical infrastructure.	6.3, 6.3.1

PUC § 8387 (b)	DESCRIPTION	PLAN SECTION
(2) (J)	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:	4.3
(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.	4.3
(2) (J) (ii)	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.	4.2
(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.	5.1
(2) (L)	A methodology for identifying and presenting enterprise-wide safety risk and wildfire-related risk.	4.1, 4.3
(2) (M)	A statement of how the local publicly owned electric utility or electrical cooperative will restore service after a wildfire.	8, 8.1, 8.2
(2) (N)	A description of the processes and procedures the local publicly owned electric utility or electric cooperative shall use to do all of the following.	
(2) (N) (i)	Monitor and audit the implementation of the wildfire mitigation plan.	9.1, 9.1.1
(2) (N) (ii)	Identify any deficiencies in the wildfire mitigation plan or its implementation and correct those deficiencies.	9.4, 9.4.2, 9.4.5
(2) (N) (iii)	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.	9.4.4, 9.4.4.1

PUC § 8387 (b)	DESCRIPTION	PLAN SECTION
(3)	The local or publicly owned electric utility or electrical cooperative shall present each wildfire mitigation plan in an appropriately noticed public meeting. The local or 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 WMP complies with all applicable rules, regulations, and standards as appropriate.	10
(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.	10

2. Analysis of Plan Elements

For clarity, we will review and analyze each plan element in the order they appear in the PUC 8387 code.

2.1 Responsibilities of Persons Responsible for Executing the Plan

Code requirement: PUC 8387(2)(A)

Location in the plan: Sections 9.1, 9.4.1

The WMP identifies SMUD’s management and key staff members responsible for implementing various aspects of the plan. Specifically, the Chief Grid Strategy and Operations Officer has overall responsibility for the plan.

The Chief Energy Delivery Officer and Chief Customer Officer are responsible for executing the various components of the plan.

The Chief Grid Strategy and Operations Officer and the Chief Energy Delivery Officers are responsible for monitoring and auditing the targets specified in the plan.

Table 6 identifies the SMUD Directors, departments and workgroups responsible for specific mitigation activities.

2.2 Objectives of the Wildfire Mitigation Plan

Code requirement: PUC 8387(2)(B)

Location in the plan: Sections 1.3, 2.5

Section **1.3** identifies three overarching objectives of the plan as listed below.

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 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.

The secondary plan objective is improved resiliency of the SMUD's line standards and construction. To this end, SMUD is assessing new industry practices and technologies, reviewing wildfire investigation reports that shed light on the root causes of wildfires and how they can be addressed.

Section **2.5** discusses a broad range of goals and objectives as they apply to:

- Environmental Protection
- Customer and Community Services
- Financial Stability
- Workforce Planning
- Local Control
- Community and Collaboration
- Infrastructure Investment
- Risk Management

2.3 Preventive Strategies and Programs

Code requirement: PUC 8387(2)(C)

Location in the plan: Sections 3, 4.2

Table 2 on pages 15 through 17 itemizes the various programs and activities in the following operational categories:

- Design and Construction
- Inspection and Maintenance
- Operational Practices
- Situational Awareness
- Response and Recovery

PUC 8387(2)(C) requires climate change be considered in the overall risk assessment and preventive strategy planning. The impacts of climate change on the service area are discussed in section **4.2**.

2.4 Metrics and Assumptions for Evaluating Plan Performance

Code requirement: PUC 8387(2)(D)

Location in the plan: Section 9.2.1

Metrics for measuring plan performance are listed in Table 7. SMUD has selected two metrics for inclusion in the plan. This metrics are unchanged from the 2019 plan. Recommendation for increasing the number of metrics is discussed in the conclusion of this evaluation.

2.5 Application of Previously Identified Metrics

Code requirement: PUC 8387(2)(E)

Location in the plan: Section 9.2.1

The plan states that “SMUD staff modified existing software to track ignition events”. As this is the second iteration of SMUD’s WMP, there is an expectation that minimal data is available for review. A brief discussion of the data collection and review methods is recommended.

2.6 Protocols for Disabling Reclosers, De-energizing Lines, and Public Safety Impacts

Code requirement: PUC 8387(2)(F)

Location in the plan: Sections 6.1.1, 6.1.2, 6.2.1, 6.2.2

Section **6.1.1** describes SMUD’s recloser operational practices during “Fire season”, which is defined as the period from May 1 to October 31. A Red Flag Warning in effect is also defined a trigger for disabling automatic reclosing on certain substation and line reclosers that extend into the Pole Clearing Area (PCA). Reclosing will remain disabled until the first major rain event in the service territory.

Planned de-energization for the distribution system is discussed in section **6.1.2**. This section calls out many of the possible triggers SMUD’s Distribution System Operations (DSO) personnel will use in the decision-making process for de-energizing portions of the system. Power system knowledge as well as potential community impacts are cited in addition to the weather-related inputs.

All Valley 115 kV, 2.0 kV and UARP 69 kV, 230 kV transmission auto reclosers are disabled and will remain disabled to mitigate risks.

6.2.2: This section discusses the protocols for de-energizing the transmission system by the Power System Operators (PSO). A different set of triggers is used in the decision-making process for transmission system de-energization by the PSO.

7.2: SMUD has identified key stakeholders, public safety partners, including potentially affected federal, state and local elected officials, City and County executive staff, tribe representatives and first responders that are contacted leading up to an imminent de-energization event. 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.

2.7 Customer Notification Prior to De-energizing Electrical Lines

Code requirement: PUC 8387(2)(G)

Location in the plan: Sections 7.1, 7.2, 7.2.1, 7.2.2

7.1: This section describes SMUD's feasible coordination protocols with relevant safety agencies during emergencies and outages, and the integration of the Standardized Emergency Management System (SEMS) is described in this section.

7.2: SMUD's Public Information Specialists is identified as the staff member responsible for providing mass media communications to the public via news media and social media platforms regarding emergencies or potential emergencies.

Protocols for notifying County OES of de-energization events are described.

SMUD provides proactive communication of wildfire threat for the following conditions:

1. Wildfire threat to localized circuits within the SMUD service territory that results in localized de-energization.
2. Wildfire threat to SMUD's Upper American River Project (UARP - hydroelectric) that results in a de-energization event causing a capacity/energy shortage (rotating outages).
3. 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.

Prior to peak fire season, SMUD provides the following communications:

- Letters to Medical Equipment Discount Rate program (MED Rate) and Senior ID customers.
- Outdoor billboards
- Articles in Customer newsletters (print and email)

SMUD provides community education on its website regarding:

- Emergency preparedness
- SMUD's wildfire policies and mitigation efforts
- Outage map
- Information on the De-energization process

SMUD has a Government Affairs Representative tasked with communicating with local governments, federal and tribe representatives.

Key stakeholders and public safety partners, including potentially affected federal, state and local elected officials, City and County executive staff, tribe representatives, telecommunications utilities and first responders are also contacted via a variety of channels and personnel.

7.2.1, 7.2.2: De-energization (Public Safety Power Shutoff) is a last resort to maintain public and customer safety during extreme fire risk conditions. SMUD provides advance communication to alert key stakeholders and essential and critical customers. Protocols for notifying potentially impacted customers prior to de-energizations are described and essential customer categories and critical service providers are identified.

2.8 Plans for Vegetation Management

Code requirement: PUC 8387(2)(H)

Location in the plan: Sections 6.4, 6.4.1. 6.4.2

6.4: SMUD's VM program identifies personnel responsible for the patrol, work plans and quality control (QC) audits of the actual tree work for the T&D system in the Valley, as well as the Transmission system in the UARP. Activities are performed year-round in order to remain in compliance with applicable Federal Facilities Design, Connections and Maintenance (FAC) 003-4 and State regulations, including Public Resources Codes section 4292 and 4293, and incorporate the standards in CPUC GO 95 Rule 35.

6.4.1: SMUD Distribution VM provides routine vegetation maintenance such as pruning and removal on a time-based interval. SMUD hires contract tree crews for identified annual vegetation work. Clearance specification are called out and trimming standards are identified.

6.4.2: SMUD Transmission VM planners perform ground-based field patrols for compliance with state and federal regulations, tree to conductor clearance, and hazard tree identification. This section describes the use of arial patrols to address ongoing challenges, instructions to contractors, and trimming standards used for transmission line VM work.

2.9 Infrastructure Inspections

Code requirement: PUC 8387(2)(I)

Location in the plan: Sections 6.3.1, 6.3.2

6.3.1 Transmission line inspection intervals

- Arial patrols (Helicopter) – Twice per year
- Ground patrols - Annual
- IR inspections (Helicopter) – Annual in UARP, every two years in the Valley
- Wood pole intrusive inspections – Once every 10 to 14 years
- VM of right of way – Annually in the UARP, 1 to 3 years in the Valley
- Splice assessment program

6.3.2 Distribution line inspection

- Detailed line inspection – Every 5 years on OH and pad-mounted, every 3 years on UG
- Line patrols – Annually on all distribution lines and equipment
- Helicopter IR inspection – SMUD performs helicopter IR inspections on 69 kV circuits in the Valley and 12 kV circuits within the PCA every 2 years
- Wood pole intrusive inspections – Once every 10 to 14 years
- Pole Clearing – Per PRC 4292, certain poles are cleared of vegetation within a 10' radius by contractors in the PCA prior to May 15th of each year
- Distribution Substations – Per CPUC GO 174
- Substation Visual Inspections – 10 times per year

2.10 List of Prioritized Wildfire Risks and Risk Drivers

Code requirement: PUC 8387(2)(J)

Location in the plan: Section 4.3

4.3 Figure 4 identifies key enterprise-wide safety and wildfire risk through the use of a bow tie analysis diagram. This diagram identifies the key risk drivers, triggering event and the prioritized key risk impacts.

The identified key risk drivers are:

- Contact from Objects
 - Animal
 - Mylar Balloons
 - Vegetation
 - Vehicle
- Equipment/Facility Failure
 - Capacitor Bank
 - Conductor

- Crossarm
- Fuse
- Insulator
- Splice/Clamp, Connector
- Transformer
- Wire to Wire Contact/Contamination (high wind)
- Other
 - Unknown
 - Third Party Acts/Vandalism
 - Acts of SMUD

The key risk impacts are listed in the bowtie diagram and are discussed in more detail in section **4.4**.

2.11 Risks and Risk Drivers Associated with Design, Construction, Operation and Maintenance

Code requirement: PUC 8387(2)(J)(i)

Location in the plan: Section 4.3.1, 4.4

4.3.1: Some of the key risk drivers and their impacts are discussed in detail in this section. These identified risks include:

- Contact from Objects
- Equipment/Facility Failure
- Wire-to-Wire Contact
- SMUD Non-Electrical Equipment
- Acts of vandalism
- Weather

The key risk impacts of the risk drivers listed above are discussed in section **4.4**.

2.12 Risks and Risk Drivers Associated with Topographic and Climatological Risk Factors

Code requirement: PUC 8387(2)(J)(ii)

Location in the plan: Section 4.2

SMUD assess in the WMP a number of climate-related factors that have contributed to the increased risk of wildfires. The severity of wildfires is generally a function of the combustible vegetation involved, terrain or topography and weather conditions. Tree stress and mortality, including damage due to insect infestations such as the bark beetle provide 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.

Table 4 provides an overview of SMUD's T&D assets in relation to the CPUC High Fire Threat Districts.

Figure 6 depicts the California Public Utility Commission (CPUC) tier 2 and tier 3 areas for SMUD's UARP facilities.

2.13 Identification of Higher Threat Areas

Code requirement: PUC 8387(2)(K)

Location in the plan: Section 5.1

SMUD worked with local fire and government officials to assess whether any areas within SMUD's service territory are at an elevated or extreme risk of powerline ignited wildfire. It was determined 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 High Fire Threat Districts (HFTD). Outside of its service area SMUD's UARP facilities, including approximately 3 miles of 4kV power lines are situated within both Tier 2 and Tier 3 of the HFTDs.

Table 4 provides an overview of SMUD's T&D system in the High Fire Threat Districts (HFTD). Only a small fraction of the system is located within Tier 2 or Tier 3 HFTDs.

2.14 Wildfire Risk Methodology

Code requirement: PUC 8387(2)(L)

Location in the plan: Sections 4, 4.1, 4.3

Section 4.1 describes SMUD's Enterprise Risk Management (ERM) process for assessing risk. The ERM framework stems from SMUD's Board of Director's Strategic Direction and overseen by the Enterprise Risk Oversight Committee (EROC).

The ERM framework consists of a five-step process integrated with SMUD's internal audit process.

- Identify
- Analyze
- Plan and Evaluate
- Respond
- Monitor

4.3: SMUD consulted with subject matter experts to conduct a bowtie analysis, which is illustrated in Figure 4. The bowtie diagram links key wildfire risk drivers with outcomes and consequences. This analysis 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, velocity and impact.

2.15 Service Restoration Process

Code requirement: PUC 8387(2)(M)

Location in the plan: Sections 8, 8.1, 8.2

Section 8 and 8.1 of the WMP describes SMUD’s protocols for restoration of service after a preemptive shutdown of power lines as well as instances of damage to assets from wildfire. Steps taken prior to energizing lines include:

1. Patrol
2. Repair
3. Test
4. Restore

Section 8.2 describes in detail the utility’s five-step process for reconstruction of infrastructure after a wildfire. This process includes:

1. Assessment
2. Planning
3. Mobilize
4. Rebuild
5. Restore

2.16 Monitor and Audit the Implementation of the WMP

Code requirement: PUC 8387(2)(N)(i)

Location in the plan: Sections 9.1, 9.1.1, 9.4

Section 9.1 identifies the key staff member with the overall responsibility for the plan, and the staff accountable for implementing the various plan components.

Table 6 identifies the Director of the departments and workgroups responsible for oversight of the various mitigation activities outlined in the plan. 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.

Section 9.4 describes the monitoring and review process. 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.

2.17 Identify Deficiencies in the WMP

Code requirement: PUC 8387(2)(N)(ii)

Location in the plan: Sections 9.4, 9.4.2, 9.4.5

9.4: 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.

9.4.2: When deficiencies are identified, the Chiefs or their delegates are responsible for correcting the deficiencies. As this is a multi-year plan with long range goals, many of the programs have only started collecting data. Through the annual update, several projects start and end dates will be revised.

Audit and Quality Services (AQS) is SMUD's independent internal audit department which provides objective assurance and consulting services to the Board of Directors and management. The stated goal is to provide 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

9.4.5: 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. Adherence to plans, policies and procedures are some of the areas of oversight provided by AQS as applied to the WMP.

2.18 Monitor and Audit the Effectiveness of Inspections

Code requirement: PUC 8387(2)(N)(iii)

Location in the plan: Sections 9.4.4, 9.4.4.1

9.4.4 SMUD has developed quality control (QC) process which are part of the general operations for the utility. More specific formal QC processes have been implemented for certain programs such as Distribution System inspections and the Vegetation Management program.

Section 9.4.4.1 SMUD’s Maintenance Planning Group manages all T&D line and substations assets. This group is responsible for developing the comprehensive inspection and maintenance programs with the goal of ensuring the safe operations of all assets and reduce the risk of power-related wildfire.

The inspection and maintenance program prioritizes 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

Table 8 summarizes the various inspection and maintenance programs including completion targets and brief overviews of the inspection process for each inspection type.

2.19 Public Comments

Code requirement: PUC 8387(3)

Location in the plan: Section 10

A draft of the 2021 WMP has been made available at www.smud.org/WildfireSafety for download by the general public. A summary of the changes from the 2019 WMP have also been posted on SMUD’s website. The website states that comments will be received via emails to wmp@smud.org until November 6th, 2020. Public comments will be received at an appropriately noticed meeting before plan adoption in the fall of 2020.

2.20 Independent Evaluation

Code requirement: PUC 8387(3)(c)

Location in the plan: Section 10

PUC 8387 requires all California WMPs be evaluated by a qualified independent evaluator with experienced in assessing the safe operation of electrical infrastructure to review and assess the comprehensiveness of its wildfire mitigation plan.

The 2021 SMUD WMP, prepared by SMUD staff, was evaluated by BKI Engineering Services.

3. Conclusion

We find that the SMUD 2021 WMP is comprehensive and meets all plan requirements set forth by PUC 8387(b). We recommend the following be implemented in future WMP updates as necessary:

3.1 8387(2)(D) Metrics and Assumptions for Evaluating Plan Performance

The use of metrics is intended to aid in evaluating WMP performance. While the adopted metrics are aligned with the overarching goal of the WMP, the general nature of the selected metrics make it difficult to trace improvements or negative results to specific mitigation efforts. For example, a reduction of "*ignition events*" cannot be easily attributed to a fuse replacement program, enhanced vegetation management or bare wire to covered conductor conversion. If there are no ignition events for a number of years, no usable data will have been collected. It is unclear how SMUD will identify areas of its operations that are disproportionately impacted by a negative result of the "Ignition Events" metric.

While the PUC 8387(2)(D) does not specify a minimum number of metrics, it is recommended that the number of metrics, with targeted applicability to specific efforts, be increased to better gauge the success of the many programs and mitigation activities outlined in Table 2. Additionally, the underlying assumptions for the selected metrics should be addressed in the plan.