OFFICE OF ENERGY INFRASTRUCTURE SAFETY

2023-2025 WILDFIRE MITIGATION PLAN TECHNICAL GUIDELINES

December 6, 2022

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Introduction to the Guidelines

This document is the Office of Energy Infrastructure Safety's Wildfire Mitigation Plan (WMP) Technical Guidelines for the 2023-2025 comprehensive WMP (Base WMP).

Authority

Energy Safety has authority under Government Code section 15475.6 to "adopt guidelines setting forth the requirements, format, timing, and any other matters required to exercise its powers, perform its duties, and meet its responsibilities described in Sections 326, 326.1, and 326.2 and Chapter 6 (commencing with Section 8385) of Division 4.1 of the Public Utilities Code…"

Pursuant to Public Utilities Code section 8386(b), electrical corporations must annually prepare and submit a WMP to the Office of Energy Infrastructure Safety (Energy Safety) for review and approval. The plans must cover at least a three-year period and must satisfy requirements set forth by Energy Safety. At its discretion, Energy Safety may allow the annual submissions to be updates to the last approved Base WMP, provided that each electrical corporation submits a Base WMP at least once every three years.

Purpose and Scope

Energy Safety's WMP Technical Guidelines (Guidelines) set forth substantive and procedural requirements for electrical corporations to prepare and submit their 2023–2025 Base WMPs, including the Electrical Corporation Wildfire Mitigation Maturity Survey (Maturity Survey). The Guidelines address wildfire risk analysis; risk-informed decision making; risk evaluation; grid design, operations and maintenance; vegetation management; situational awareness; emergency preparedness; community outreach and engagement; and Public Safety Power Shutoffs (PSPS).

The Guidelines apply to electrical corporations in the State of California. At present, there are nine electrical corporations: Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E), PacifiCorp, Liberty Utilities (CalPeco Electric), LLC (Liberty), Bear Valley Electrical Service, Inc. (BVES), Trans Bay Cable, LLC (TBC), Horizon West Transmission, LLC (HWT), and LS Power Grid California, LLC (LSPGC).

Improvements to the WMP Guidelines

Building on the improvements made since 2019, including lessons from the 2020, 2021, and 2022 WMP submissions and subsequent evaluations, Energy Safety has further improved the Guidelines for the 2023-2025 Base WMP in the following key areas:

- Restructuring of chapters (i.e., implementation of a "problem solving" framework for flow of sections and consolidation of key technical areas into dedicated sections)
- Addition of a new section for an overview of electrical corporation service territory overview (Section 5)
- Addition of a risk-informed WMP development framework (Section 6)
- Substantial changes to the risk modeling and assessment reporting framework and requirements (Section 6)
- Addition of a section on WMP risk-informed decision making and high-level wildfire risk mitigation strategy (Section 7)
- Addition of new mitigation initiatives in the situational awareness and forecasting section (Section 8.3)
- Reorganization of the emergency preparedness section (Section 8.4) to focus on government agencies coordination, with community outreach and engagement (Section 8.5) to focus on collaboration with non-governmental organizations and the public
- Overhaul of the Maturity Survey (i.e., addition, modification, and consolidation of categories and capabilities, addition of new sub-capabilities)
- Integration of Energy Safety compliance assurance features into the Guidelines
- Integration and coordination of Maturity Survey categories and capabilities into the Guidelines

General Instructions

The following sections provide general instructions for electrical corporations to prepare their WMPs. Specific instructions are provided in the body of the Guidelines, starting at Section 1, "Executive Summary."

Electrical corporations must reference the 2023-2025 WMP Process and Evaluation Guidelines for procedural requirements, such as submission information, document maintenance, and file naming conventions.

Electrical corporations must reference the Energy Safety Data Guidelines for requirements related to both spatial and non-spatial data submissions.

Narratives

Each section of an electrical corporation's WMP must include narrative responses. The narrative responses must provide qualitative descriptions and explanations of the requested information, supported with a variety of visual aids (e.g., maps, summary tables, diagrams, flow charts, photographs, sample calculations or equations) and other supporting documentation to communicate and substantiate concepts and strategies. Each narrative must be clear and concise and must include a high-level bulleted summary of key takeaways for each section (where appropriate). Electrical corporations must not duplicate narratives across different WMP sections.

Mitigation Initiatives Without Plans

An electrical corporation does not need to have plans for every mitigation initiative indicated in the Guidelines, only for initiatives that the electrical corporation is implementing. If an electrical corporation does not have plans for an initiative indicated in the Guidelines, the electrical corporation must provide a brief narrative in the relevant section explaining why.

Cross-Referencing

An electrical corporation's WMP must include cross-referencing and hyperlinks to avoid duplication of narratives and provide quick referencing of other relevant sections. All figures and tables must include captions with hyperlink references in the text. Submissions in PDF format must incorporate electronic bookmarks for all sections, main headings, and subheadings.

Utility Initiative Tracking IDs

The electrical corporations must use "Utility Initiative Tracking IDs" (Tracking IDs) throughout their WMPs. In previous years, Energy Safety and the electrical corporations tracked mitigation initiatives using the section numbers from the WMP Guidelines. For example, in the 2022 WMP Updates, "Covered Conduction Installation" was covered in Section 7.3.3.3 and was therefore tracked using "7.3.3.3." In their 2023-2025 Base WMPs, electrical corporations must implement their own tracking system using Tracking IDs specified in the Energy Safety Data Guidelines to tie objectives, targets, narratives, and initiatives together throughout their WMPs. Consistent Tracking IDs must be used in WMP submissions and Quarterly Data Reports (QDRs).

Reminders to use the Tracking IDs are included throughout these Guidelines.

Quantitative and Tabulated Responses

The electrical corporations must provide quantitative information to support narratives and qualitative descriptions. Electrical corporations must use the example tables as templates for reporting requested information according to the instructions provided in the respective sections. Populated cells in example tables are examples provided by Energy Safety. Those tables not denoted as examples (i.e., Table 4-2) are meant to be adopted by the electrical corporation as written. Where applicable, quantitative and tabulated responses must match information provided in QDRs.

Mapping Requirements

Where the Guidelines require the electrical corporations to produce a map or series of maps, the electrical corporation must provide a (one) representative map within the main body of its WMP. Where electrical corporations need to provide additional maps for clarity (e.g., the scale is insufficiently large to show useful detail), the electrical corporation must either provide those additional maps in Appendix C or host applicable geospatial layers on a publicly accessible web application. If the electrical corporation chooses the latter option, it must refer to the specific web address in appropriate places throughout its WMP. Additionally, the electrical corporation must host these layers until the submission of its 2026-2028 WMP or until otherwise directed by Energy Safety. The electrical corporation may not modify these publicly available layers without notifying Energy Safety.

Inaccessable Information or Data

If any portion of the Guidelines requires information or data that the electrical corporation cannot collect and/or is not obtainable from peer electrical corporations, the electrical corporation is required to work with stakeholders including federal, state, and local agencies and other partners to obtain the necessary information. When information or data required by the Guidelines is not collected by any stakeholder, then the electrical corporation must identify these circumstances and provide a description of an alternative source of information or data or identify a proxy for that information or data that most closely fits the original requirement. The electrical corporation's WMP must clearly cite the source(s) of the information or data used in lieu of the required information or data.

Energy Safety may direct the electrical corporation to provide a plan for its information or data collection and/or cooperation with stakeholders for collecting the required information or data, including a timeline for implementation.

Relevant Regulations, Codes, and Standards

The electrical corporation must cite relevant regulations, codes, and standards (both external and internal standards) throughout its WMP. The electrical corporation must provide the title or tracking number of the regulation, code, or standard in parentheses next to the relevant text, or in the appropriate column if noted in a table. The electrical corporation must provide citations in footnotes.

Foundational Documents

The electrical corporation must cite documents that are foundational to its WMP throughout the WMP (e.g., an emergency preparedness plan).

In accordance with the WMP Process and Evaluation Guidelines, each electrical corporation must post all documents referenced in its WMP in an easy-to-follow format on a web page dedicated to its WMP.

1. Executive Summary

In the opening section of the WMP, the electrical corporation must provide an executive summary that is no longer than 10 pages. The executive summary must provide brief narratives on each of the following topics.

Summary of the 2020–2022 WMP Cycle

The electrical corporation must provide a brief overview of its progress in achieving the goals, objectives, and targets specified in the previous WMP submissions. The overview must discuss areas of success, areas for improvement, and any major lessons learned.

Summary of the 2023–2025 Base WMP

The electrical corporation must summarize the primary goal, plan objectives, and framework for the development of the WMP for the three-year cycle. The electrical corporation may use a combination of brief narratives and bulleted lists.

2. Responsible Persons

The electrical corporation must list those responsible for executing the WMP, including:

- Executive-level owner with overall responsibility
- Program owners with responsibility for each of the main components of the plan
- As applicable, general ownership for questions related to or activities described in the WMP

Titles, credentials, and components of responsible person(s) must be released publicly. Electrical corporations can reference the WMP Process and Evaluation Guidelines and California Code of Regulations Title 14 section 29200 for the submission process of any confidential information.

3. Statutory Requirements Checklist

This section provides a checklist of the statutory requirements for a WMP as detailed in Public Utilities Code section 8386(c). By completing the checklist, the electrical corporation affirms that its WMP addresses each requirement.

For each statutory requirement, the checklist must include a reference and hyperlink to the relevant section and page number in the WMP. Where multiple WMP sections provide the information for a specific requirement, the electrical corporation must provide references and hyperlinks to all relevant sections. Unique references must be separated by semicolons, and each must include a brief summary of the contents of the referenced section (e.g., Section 5, pp. 30–32 [workforce]; Section 7, p. 43 [mutual assistance]).

Table 3-1 provides an example of the minimum acceptable level of information and citation for the statutory requirements checklist.

Table 3-1. Example of Statutory Requirements Checklist

Public Utilities Code section 8386	**Description**	**WMP Section/Page**
(c)(2)	The objectives of the WMP	Section 4.2, p. 13
(c)(10)	Protocols for the PSPS of the electrical corporation's transmission infrastructure, etc.	Section 5 overview, pp. 30–31
(c)(19)	A description of how the WMP is consistent with the electrical corporation's disaster and emergency preparedness plan prepared pursuant to Public Utilities Code section 768.6,	Sections 7.3.9.2 to 7.3.9.3, pp. 790–801 (community outreach and customer support before, during, and after wildfires and

Public Utilities Code section 8386	Description	WMP Section/Page
	including plans to restore service and community outreach	customer support during emergencies) Section 7.3.9.4, pp. 802–804 (emergency plan) Section 7.3.9.5, pp. 805–808 (preparedness and planning for service restoration after emergency) Section 7.3.10.1, pp. 812–842 (community engagement to prepare for wildfire, PSPS, and protective devices and sensitivity settings)

4. Overview of WMP

4.1 Primary Goal

Each electrical corporation must state the primary goal of its WMP. At a minimum, the electrical corporation must affirm its compliance with California Public Utilities Code section 8386(a):

> *Each electrical corporation shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of catastrophic wildfire posed by those electrical lines and equipment.*

4.2 Plan Objectives

In this section, the electrical corporation must summarize its plan objectives over the 2023-2025 WMP cycle. Plan objectives are determined by the portfolio of mitigation initiatives proposed in the WMP.

4.3 Proposed Expenditures

Each electrical corporation must summarize its projected expenditures in thousands of U.S. dollars per year for the next three-year WMP cycle, as well as the planned and actual expenditures from the previous three-year WMP cycle (e.g., 2020–2022), in both tabular and graph form.

Table 4-1 provides an example of the minimum acceptable level of information summarizing an electrical corporation's WMP expenditures. The financials represented in the summary table equal the aggregate spending listed in the financial tables of the QDR (see the Energy Safety Data Guidelines). Energy Safety's WMP evaluation, including approval or denial, must not be construed as approval of, or agreement with, costs listed in the WMP.

Table 4-1. Example of Summary of WMP Expenditures

Year	Spend (thousands $USD)
2020	Planned (as reported in the 2020 WMP) = Actual = ±△ =
2021	Planned (as reported in the 2021 WMP Update) = Actual = ±△ =
2022	Planned (as reported in the 2022 WMP Update) = Actual = ±△ =
2023	Planned =
2024	Planned =
2025	Planned =

4.4 Risk-Informed Framework

The electrical corporation must adopt a risk-informed approach to developing its WMP. The purposes of adopting this approach are as follows:

- To develop a WMP that achieves an optimal level of life safety, property protection, and environmental protection, while also being in balance with other performance objectives (e.g., reliability and affordability)
- To integrate risk modeling outcomes with a range of other performance objectives, methods, and subject matter expertise to inform decision-making processes and the spatiotemporal prioritization of mitigations

- To target mitigation efforts that prioritize the highest-risk equipment, wildfire environmental settings, and assets-at-risk (e.g., people, communities, critical infrastructure), while still satisfying other performance objectives defined by the California Public Utilities Commission (CPUC) (e.g., reliability and affordability)
- To provide a decision-making process that is clear and transparent to internal and external stakeholders, including clear evaluation criteria and visual aids (such as flow charts or decision trees)

The risk-informed approach adopted by the electrical corporation must, at a minimum, incorporate several key components, described below. In addition, the evaluation and management of risk must include consideration of a broad range of performance objectives (e.g., life safety, property protection, reduction of social vulnerability, reliability, resiliency, affordability, health, environmental protection, public perception, etc.), integrate cross-disciplinary expertise, and engage various stakeholder groups as part of the decision-making process.

The risk-informed approach must have seven minimum components, as described in Table 4-2.

Table 4-2. Risk-Informed Approach Components

Risk-Informed Approach Component	**Brief Description**
1. Goals and plan objectives	The first step in the risk-informed approach is to identify the primary goal(s) and plan objectives of the electrical corporation's WMP. These goals and objectives are electrical corporation-specific and must be defined and described in Sections 4.1 and 4.2.
2. Scope of application (i.e., electrical corporation service territory)	The second step is to define the physical characteristics of the system in terms of its major elements: electrical corporation service territory characteristics, electrical infrastructure, wildfire environmental settings, and various assets-at-risk (e.g., communities and people, property, critical infrastructure, cultural/historical resources, environmental services). Knowledge and understanding of how individual

Risk-Informed Approach Component	Brief Description
	system elements interface are essential to this step. Sections 5–5.4 provide instructions on what electrical corporations must present regarding physical traits, environmental characteristics, and potential assets at risk in their service territory.
3. Hazard identification	The third step is to identify hazards and determine their likelihoods. Section 6.2.1 provides instructions on hazard identification.
4. Risk scenario identification	The fourth step, based on the context and desired values, is to develop risk scenarios that could lead to an undesirable event. Risk scenario techniques that may be employed include event tree analysis, fault tree analysis, preliminary hazard analysis, and failure modes and effects analysis. Section 6.3 provides instructions on risk scenario identification.
5. Risk analysis (i.e., likelihood and consequences)	The fifth step is to evaluate the likelihood and consequences of the identified risk scenarios to understand the potential impact on the desired goal(s) and plan objectives. The consequences are based on an array of risk components that are fundamental to overall utility risk, wildfire risk, and PSPS risk given the electrical corporation's scope of application and portfolio of wildfire mitigation initiatives. Section 6.2.2 provides instructions on risk analysis.
6. Risk presentation	The sixth step is to consider how the risk analysis is presented to the various stakeholders involved. Section 6.4 provides instructions on risk presentation.

Risk-Informed Approach Component	Brief Description
7. Risk evaluation	After the risk analysis is complete, hazards can be resolved by either assuming the risk associated with the hazards or eliminating or controlling the hazards. Risk evaluation includes identification of criteria and procedures for identifying critical risk both spatially and temporally. Risk evaluation must also include, as a minimum, evaluating the seriousness, manageability, urgency, and growth potential of the wildfire hazard/risk. Risk evaluation should be used to determine whether the individual hazard/risk should be mitigated. Risk evaluation and risk-informed decision making should be done using a consensus approach involving a range of key stakeholder groups. Section 7 provides instructions for risk evaluation or risk-informed decision making.
8. Risk mitigation and management	In the final step, the electrical corporation must identify which risk management strategies are appropriate given practical constraints such as limited resources, costs, and time. The electrical corporation must indicate the high-level risk management approach, as determined in Step 7. The electrical corporation must identify risk mitigation initiatives (or a portfolio of initiatives) and prioritize their spatial and temporal implementation. This step includes consideration of what risk mitigation strategies are appropriate and most effectively meet the intent of the WMP goal(s) and plan objectives, while still in balance with other performance objectives. It also includes the procedures and strategies to develop, review, and execute schedules for implementation of mitigation initiatives and activities (as well as interim mitigation initiatives). Section 8 provides instructions for reporting on initiatives to mitigate identified risks.

5. Overview of the Service Territory

In this section of the WMP, the electrical corporation must provide a high-level overview of its service territory and key characteristics of its electrical infrastructure. This information is intended to provide the reader with an understanding of the physical and technical scope of the electrical corporation's WMP. Sections 5.1 - 5.4 below provide detailed instructions.

5.1 Service Territory

The electrical corporation must provide a high-level description of its service territory, addressing the following components:[1]

- Area served (in square miles)
- Number of customers served

The electrical corporation must provide a geospatial map that shows its service territory (polygons) and distribution of customers served (raster or polygons). This map should appear in the main body of the report.

Table 5-1 provides a template for presenting the required high-level service territory statistics.

[1] Annual information included in this section must align with Table 7 of the QDR.

Table 5-1. Example of Service Territory High-Level Statistics

Characteristic	**#**
Area served (sq. mi.)	
Number of customers served	

5.2 Electrical Infrastructure

The electrical corporation must provide a high-level description of its infrastructure, including all power generation facilities, transmission lines and associated equipment, distribution lines and associated equipment, substations, and any other major equipment.[2]

Table 5-2 provides a template for presenting the required information.

Table 5-2. Example of Overview of Key Electrical Equipment

Type of Equipment	**HFTD**	**Non-HFTD**	**Total**
Substations (#)			
Power generation facilities (#)			
Overhead transmission lines (circuit miles)			
Overhead distribution lines (circuit miles)			
Hardened overhead distribution lines (circuit miles)			
Hardened overhead transmission lines (circuit miles)			

[2] Annual information included in this section must align with Table 7 of the QDR.

Type of Equipment	HFTD	Non-HFTD	Total
Underground transmission and distribution lines (circuit miles)			
Distribution transformers (#)			
Reclosers (#)			
Poles (#)			
Towers (#)			
Microgrids (#)			

5.3 Environmental Settings

The electrical corporation must provide a high-level overview of the wildfire environmental settings within its service territory.

5.3.1 Fire Ecology

The electrical corporation must provide a brief narrative describing the fire ecology or ecologies across its service territory. This includes a brief description of how ecological features, such as the following, influence the propensity of the electrical corporation's service territory to experience wildfires: generalized climate and weather conditions, ecological regions and associated vegetation types, and fire return intervals.

The electrical corporation must provide tabulated statistics of the vegetative coverage across its service territory. The tabulated data must include a breakdown of the vegetation types, total acres per type, and percentage of service territory per type. The electrical corporation must identify the vegetative database used to characterize the vegetation (e.g., CALVEG). Table 5-3 provide an example of the minimum level of content and detail required.

Table 5-3. Example of Existing Vegetation Types in the Service Territory

Vegetation Type	Acres	Percentage of Service Territory
Annual grassland	51,486.1	6.04%
Coastal oak woodland	21,837.4	2.56%
Coastal scrub	74,558.4	8.75%
Mixed chaparral	138,596.5	16.26%

5.3.2 Catastrophic Wildfire History

The electrical corporation must provide a brief narrative summarizing its wildfire history for the past 20 years (2002-2022) as recorded by the electrical corporation, CAL FIRE, or another authoritative sources. For this section, wildfire history must be limited to electrical corporation ignited catastrophic fires (i.e., fires that caused at least one death, damaged over 500 structures, or burned over 5,000 acres). This includes catastrophic wildfire ignitions reported to the CPUC that may be attributable to facilities or equipment owned by the electrical corporation and where the cause of the ignition is still under investigation.[3] Electrical corporations must clearly denote those ignitions as still under investigation. In addition, the electrical corporation must provide catastrophic wildfire statistics in tabular form, including the following key metrics:

- Ignition date
- Fire name
- Official cause (if known)
- Size (acres)
- Number of fatalities

[3] CPUC emergency reporting instructions: https://www.cpuc.ca.gov/regulatory-services/safety/emergency-reporting.

- Number of structures damaged
- Estimated financial loss (U.S. dollars)

Table 5-4 provides an example of the content and level of detail required for the tabulated historical catastrophic utility-related wildfire statistics.[4] The electrical corporation must provide an authoritative government source (e.g., CPUC, CAL FIRE, U.S. Forest Service, or local fire authority) for its reporting of wildfire history data and loss/damage estimates, to the extent this information is available.

Table 5-4. Example of Catastrophic Electrical Corporation Wildfires

Ignition Date	Fire Name	Official Cause	Fire Size (acres)	No. of Fatalities	No. of Structures Destroyed and Damaged	Financial Loss (US$)

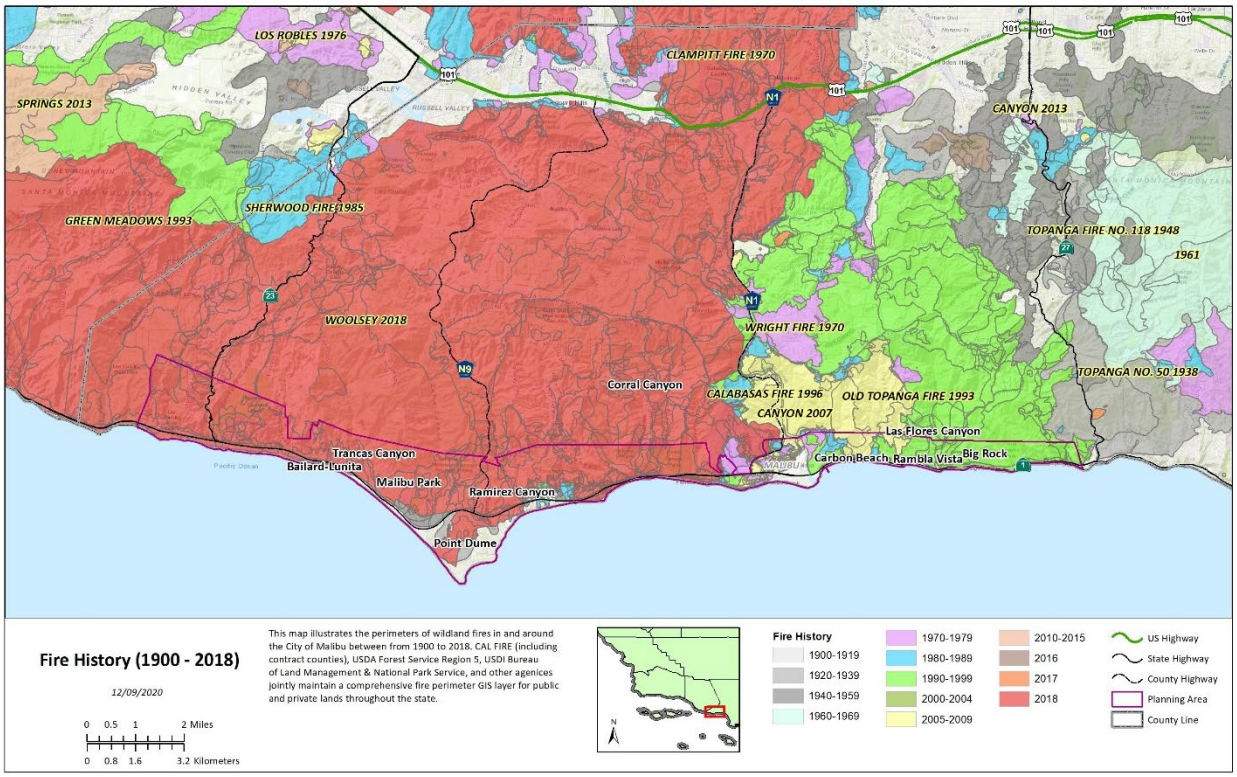
The electrical corporation must also provide a map or set of maps illustrating the catastrophic wildfires. One representative map must appear in the main body of the WMP, with supplemental or detailed maps provided in Appendix C as needed. The maps must include the following:

- Fire perimeters
- Legend and text labeling each fire perimeter
- County lines

Figure 5-1 provides an example of the content and level of detail required for the map(s).

[4] Annual information included in this section must align with Table 2 of the QDR.

Figure 5-1. Example of a Utility-Related Wildfire History Map



5.3.3 High Fire Threat Districts

The electrical corporation must provide a brief narrative identifying the CPUC-defined HFTD across its territory. The electrical corporation must also provide a map of its service territory overlaid with the HFTD. The map must be accompanied by tabulated statistics on the CPUC-defined HFTD including the following minimum information:

- Total area of the electrical corporation's service territory in the HFTD (sq. mi.)
- The electrical corporation's service territory in the HFTD as a percentage of its total service territory (%)

For the HFTD map, the HFTD layer(s) (raster or polygon) must cover the electrical corporation's service territory and the HFTD layer must match the latest boundaries as published by the CPUC. Table 5-5 provides an example of the content and level of detail required.

Table 5-5. Example of an Electrical Corporation's HFTD Statistics

High Fire Threat District	Total Area of Individual District (sq. mi.)	% of Total Service Territory
Non-HFTD	XX	85%
Tier 2	XX	5%
Tier 3	XX	8%
Total =	XX	100%

5.3.4 Climate Change

It is critical for the electrical corporation to understand general climate conditions and how climate change impacts the frequency and the intensity of extreme weather events and the vegetation that fuels fires.

5.3.4.1 General Climate Conditions

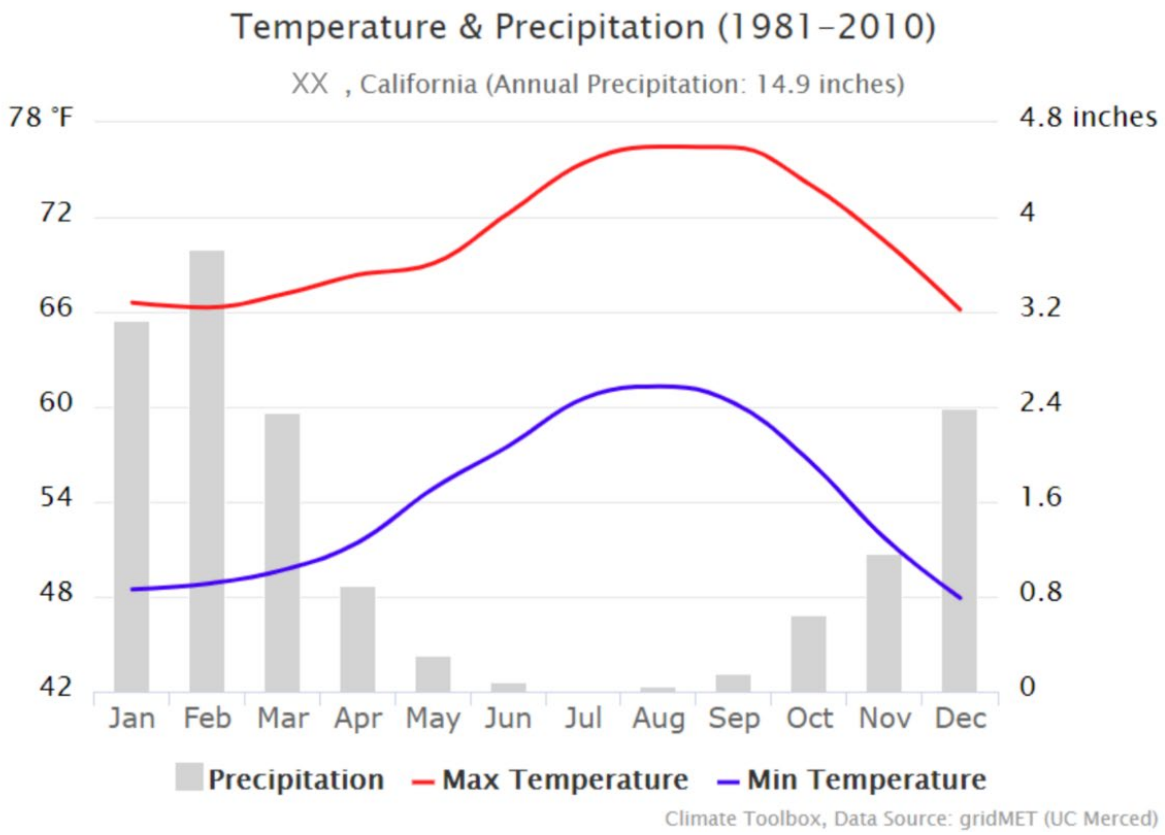
The electrical corporation must provide an overview of the general weather conditions and climate across its service territory in the past 30- to 40-year period.[5] The narrative must include, at a minimum, the following:

- Average temperatures throughout the year
- Extreme temperatures that may occur and when and where they may occur
- Precipitation throughout the year

The electrical corporation must also provide a graph of the average precipitation and maximum and minimum temperatures for each distinct climatic region of its service territory. At a minimum, it must provide one graph in the main body of the report. Figure 5-2 provides an example of the climate/weather graph.

[5] Annual information included in this section must align with Table 4 of the QDR.

Figure 5-2. Example of Annual Mean Climatology for the Electrical Corporation's Service Territory



5.3.4.2 Climate Change Phenomena and Trends

The electrical corporation must provide a brief discussion of the local impacts of anticipated climate change phenomena and trends across its service territory. In addition, the electrical corporation must provide graphs/charts illustrating:

- Mean annual temperature (Figure 5-3)
- Mean annual precipitation (Figure 5-4)
- Projected changes in minimum and maximum daily temperatures (Figure 5-5)

The electrical corporation must also indicate the increase in extreme fire danger days (historic 95th-percentile conditions) due to climate change, considering (at a minimum) the combination of warmer temperatures, drier vegetation, and changes in high-wind events (e.g., Santa Ana winds, Diablo winds, Sundowners) for both winter/spring and summer/fall periods throughout the electrical corporation service territory. Figure 5-6 provides an example of the required information on projections of extreme fire dangers.

The electrical corporation must cite all source(s) used to write and illustrate this section.

Figure 5-3. Example of Mean Annual Temperature for Service Territory, 1900s–2020s

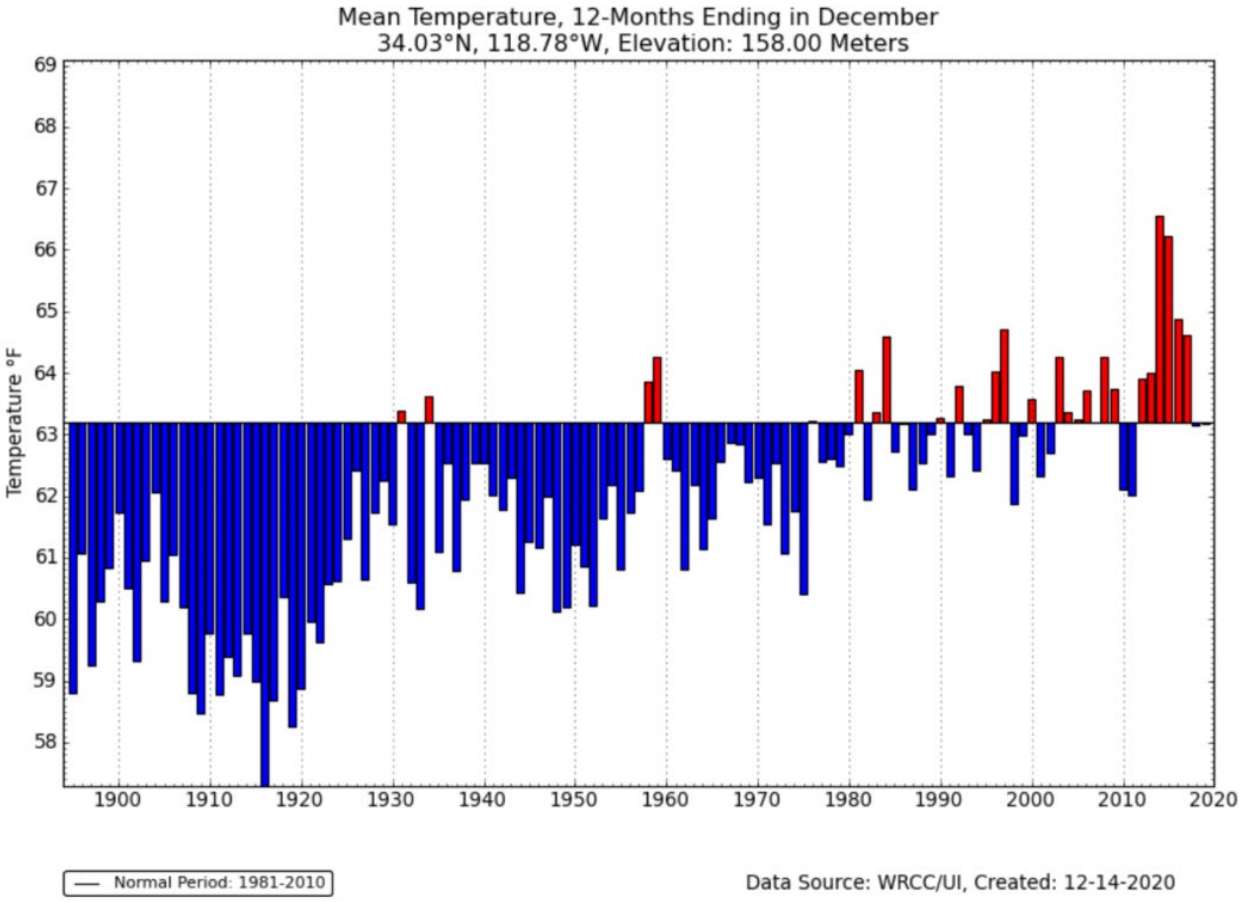


Figure 5-4. Example of Mean Annual Precipitation for Service Territory, 1900s–2020s

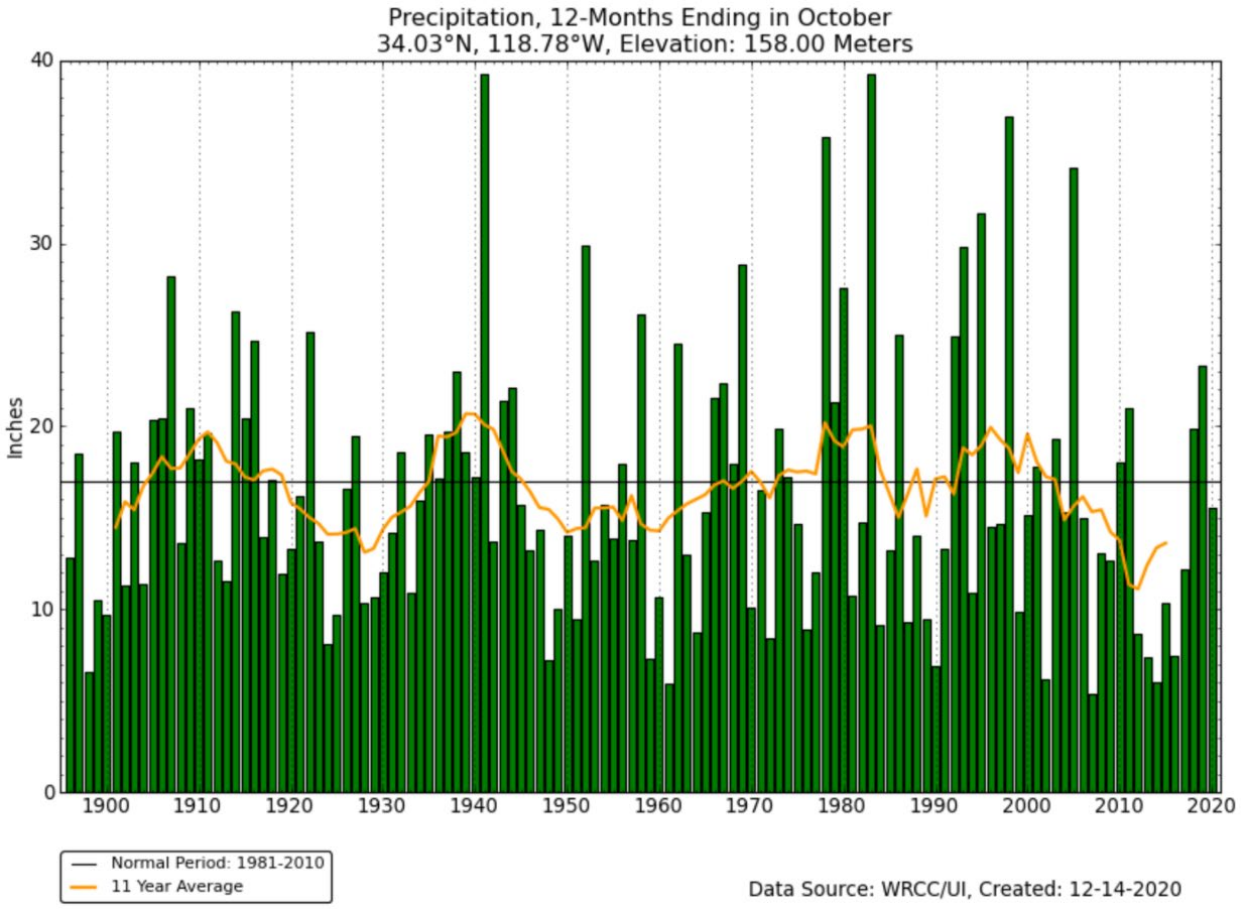


Figure 5-5. Example of Projected Change in Maximum Temperature (Daytime Highs) and Minimum Temperature (Nighttime Lows) Through 2100 for the Service Territory

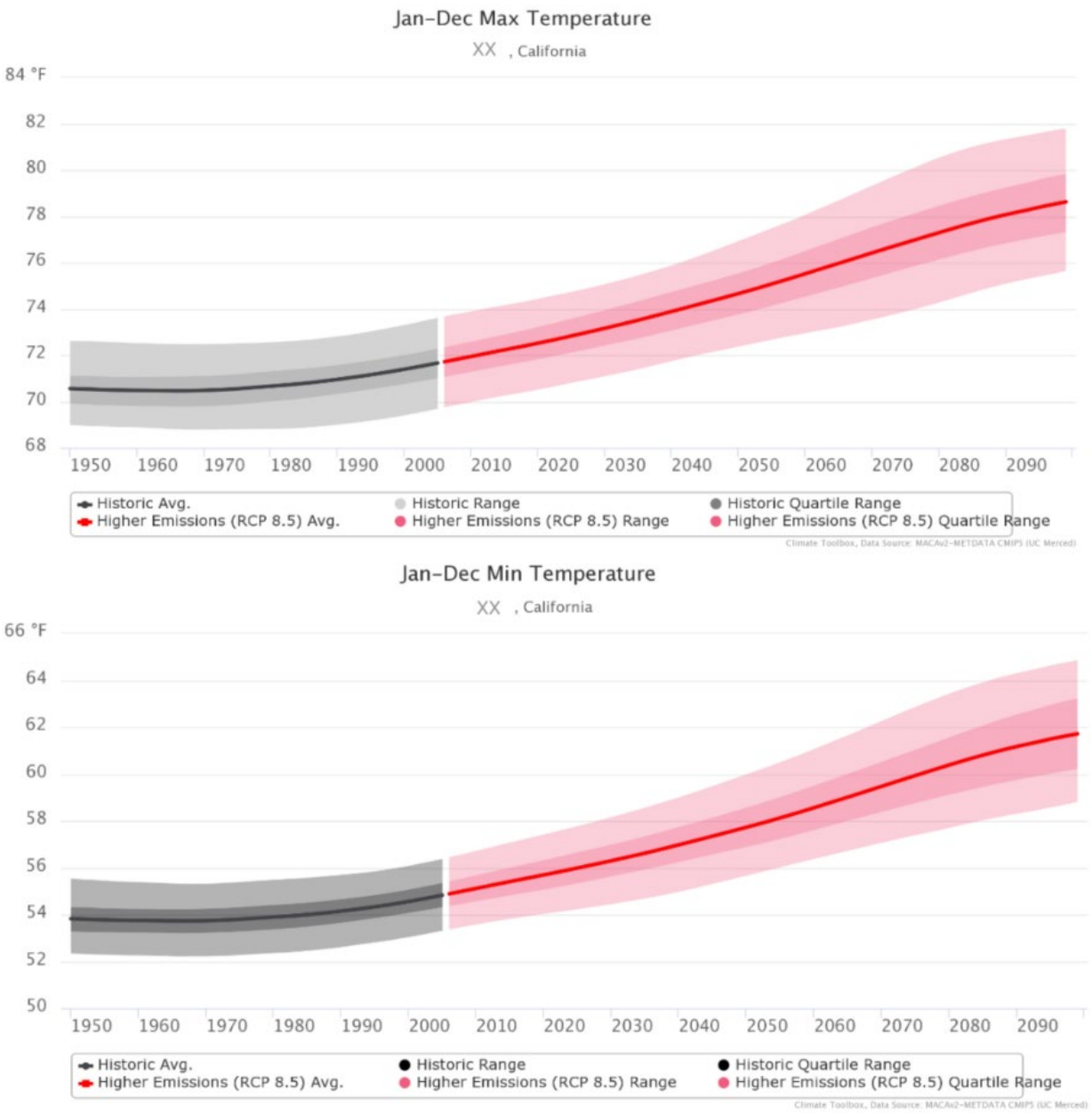
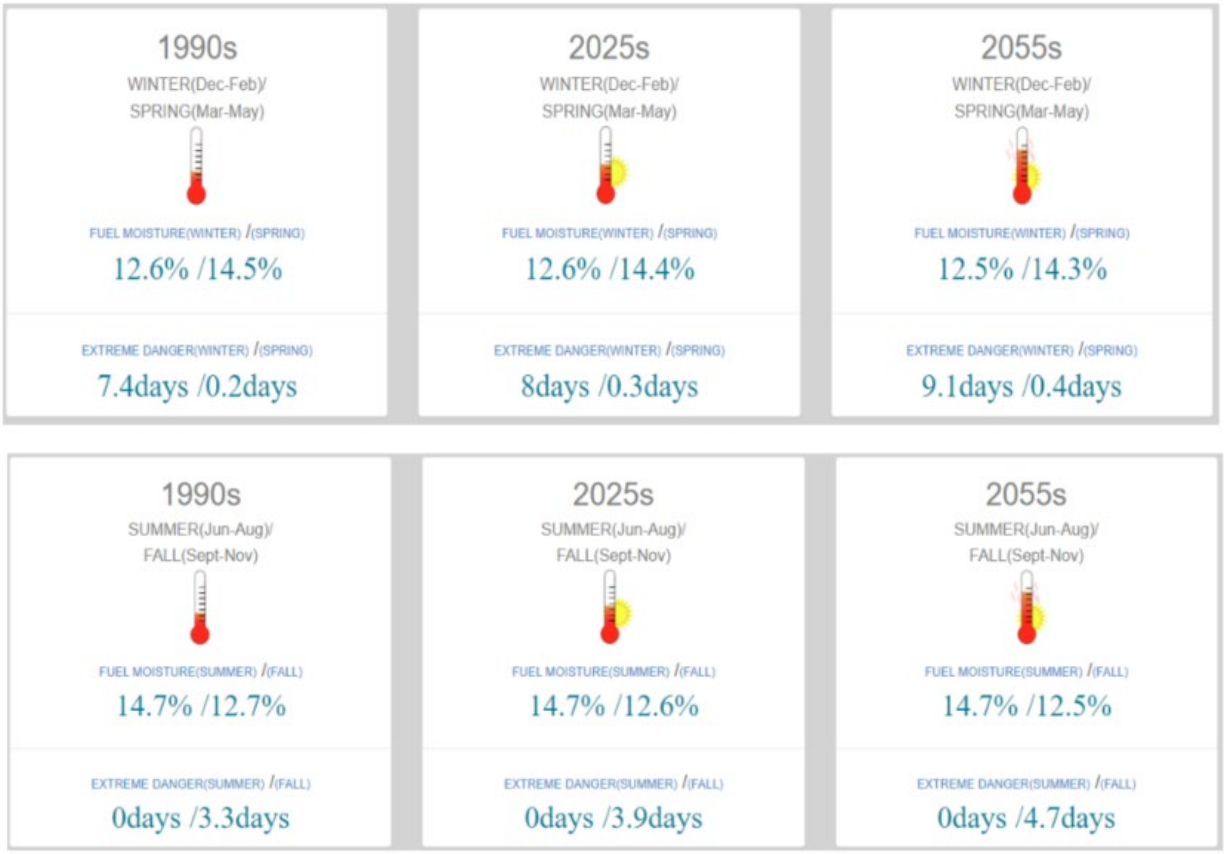


Figure 5-6. Example of Projected Changes in Average Fuel Moisture and Average Number of Days of Extreme Fire Danger for Winter/Spring and Summer/Fall Periods for the Service Territory Based on Global Climate Model Outputs



5.3.5 Topography

The electrical corporation must provide an overview and brief description of the various topographic conditions across its service territory.

5.4 Community Values at Risk

In this section of the WMP, the electrical corporation must identify the community values at risk across its service territory. Sections 5.4.1–5.4.5 provide detailed instructions.[6]

[6] Annual information included in these sections must align with Table 7 of the QDR.

5.4.1 Urban, Rural, and Highly Rural Customers

The electrical corporation must provide a brief narrative describing the distribution of urban, rural, and highly rural areas and customers across its service territory. Refer to Appendix A for definitions.

5.4.2 Wildland-Urban Interfaces

The electrical corporation must provide a brief narrative describing the wildland-urban interfaces (WUIs) across its service territory. Refer to Appendix A for definitions.

5.4.3 Communities at Risk from Wildfire

In this section of the WMP, an electrical corporation must provide a high-level overview of communities at risk from wildfire as defined by the electrical corporation (e.g., within the HFTD and HFRA). This includes an overview of individuals at risk, AFN customers, social vulnerability, and communities vulnerable because of single access/egress conditions within its service territory. Detailed instructions are provided below.

5.4.3.1 Individuals at Risk from Wildfire

The electrical corporation must provide a brief narrative (one to two paragraphs) describing the total number of people and distribution of people at risk from wildfire across its service territory.

5.4.3.2 Social Vulnerability and Exposure to Electrical Corporation Wildfire Risk

The electrical corporation must provide a brief narrative describing the intersection of social vulnerability and community exposure to electrical corporation wildfire risk across its service territory. This intersection is defined as census tracts that 1) exceed the 70th percentile according to the Social Vulnerability Index (SVI) or have a median household income of less than 80 percent of the state median, and 2) exceed the 85th percentile in wildfire consequence risk according to the electrical corporation's risk assessment(s).[7]

[7] These criteria are derived from Cal OES Recovery Division, Hazard Mitigation Assistance Branch's Multiple Hazards and Social Vulnerability Analysis, dated January 18, 2022: https://www.caloes.ca.gov/wp-content/uploads/Recovery/Documents/Socially-Vulnerable-and-High-Hazard-Risk-Community-Criteria.-Methodology.pdf & https://calema.maps.arcgis.com/apps/dashboards/3c78aea361be4ea8a21b22b30e613d6e

For SVI, the electrical corporation must use the most up-to-date version of Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry's Social Vulnerability Index dataset (Year = 2018;[8] Geography = California; Geography Type = Census Tracts).[9]

In addition, the electrical corporation must provide a single geospatial map showing its service territory (polygon) overlaid with the distribution of the SVI and exposure intersection and urban and major roadways. Any additional maps needed to provide clarity and detail should be included in Appendix C.

5.4.3.3 Sub-Divisions with Limited Egress or No Secondary Egress

The electrical corporation must provide a brief narrative overview (one to two paragraphs) describing sub-divisions with limited egress or no secondary egress, per CAL FIRE data,[10] across the electrical corporation's service territory.

5.4.4 Critical Facilities and Infrastructure at Risk from Wildfire

The electrical corporation must provide a brief narrative describing the distribution of critical facilities and infrastructure located in the HFTD/HFRA across its service territory. Critical facilities and infrastructure are defined in Appendix A.

5.4.5 Environmental Compliance and Permitting

In this section, the electrical corporation must provide a summary of how it ensures its compliance with applicable environmental laws, regulations, and permitting related to the implementation of its WMP. This overview must include:

- A description of the procedures/processes to ensure compliance with relevant environmental laws, regulations, and permitting requirements before and during WMP implementation. The process or procedure should include when consultation with

[8] As of the publishing of these Guidelines, 2018 was the most recent version of the dataset. Electrical corporations must use the most up-to-date version of the dataset.

[9] Centers for Disease Control and Prevention / Agency for Toxic Substances and Disease Registry Social Vulnerability Index Data and Documentation Download (https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html, accessed Oct. 11, 2022).

[10] Board of Forestry and Fire Protection Subdivision Review Program (https://bof.fire.ca.gov/projects-and-programs/subdivision-review-program/, accessed Oct. 11, 2022).

permittees occurs (i.e., at what stage of planning and/or implementation of activities described in the WMP)

- Roadblocks the electrical corporation has encountered related to environmental laws, regulations, and permitting related to implementation of its WMP and how the electrical corporation has addressed, is addressing, or plans to address the roadblocks.
- Any notable changes to its environmental compliance and permitting procedures and processes since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation.

The electrical corporation must also provide a table (Table 5-6 provides an example) of potentially relevant state and federal agencies that may be responsible for discretionary approval of activities described in WMPs and the relevant environmental laws, regulations, and permitting requirements. If this table extends past two pages, provide the required information in an appendix.

Table 5-6: Example of Relevant State and Federal Environmental Laws, Regulations, and Permitting Requirements for Implementing the WMP

Environmental Law, Regulation, or Permit	**Responsible Permittee/Agency**
Endangered Species Act Section 10(a)(1)(B) Incidental Take Permit	United States Fish and Wildlife Service

6. Risk Methodology and Assessment

In this section of the WMP, the electrical corporation must provide an overview of its risk methodology, key input data and assumptions, risk analysis, and risk presentation (i.e., the results of its assessment). This information is intended to provide the reader with a technical understanding of the foundation for the electrical corporation's wildfire mitigation strategy for its Base WMP. Sections 6.1–6.7 below provide detailed instructions.

For the 2023-2025 Base WMP, the electrical corporation does not need to have performed each calculation and analysis indicated in sections 6.2, 6.3, and 6.6. If the electrical corporation is not performing a certain calculation or analysis, it must describe why it does not perform the calculation or analysis, its current alternative to the calculation or analysis (if applicable), and any plans to incorporate those calculations or analyses into its risk methodology and assessment.

6.1 Methodology

In this section, the electrical corporation must present an overview of its risk calculation approach. This includes one or more graphics showing the calculation process, a concise narrative explaining key elements of the approach, and definitions of different risks and risk components.

6.1.1 Overview

The electrical corporation must provide a brief narrative describing its methodology for quantifying its overall utility risk of wildfires and PSPS. This methodology will help inform the development of its wildfire mitigation strategy (see Section 7). The electrical corporation must describe the methodology and underlying intent of this risk assessment in no more than five pages, inclusive of all narratives, bullet point lists, and any graphics.

The following is an example of this overview:

The risk assessment in this WMP is based on a quantified risk approach using a range of industry-recognized standards, best practices, and research to determine the electrical corporation's overall utility risk from wildfires and PSPS for its service territory. The intent of performing this risk analysis is to:

- *Understand the overall utility risk and associated risk components of wildfires and PSPS events spatially and temporally across the electrical corporation's service territory*
- *Use this understanding of risk to inform the development of a comprehensive wildfire mitigation strategy in Section 7 that achieves the goals and plan objectives stated in Section 4.1 and 4.2*

The risk analysis is shown schematically in a figure below. The approach consists of the following:

- *Identifying key wildfire and PSPS hazards and risk components across the electrical corporation's service territory (refer to Section 6.2.1).*
- *Identifying key modeling tools, inputs, and assumptions to quantify the likelihood and consequence of the electrical corporation's overall utility risk (refer to Section 6.2.2 and 6.2.3).*
- *Identifying credible scenarios that would expose surrounding people, assets, and natural resources (PAR) to wildfire or PSPS risks (refer to Section 6.3).*
- *Summarizing the overall utility risk and key metrics (refer to Section 6.4).*
- *Presenting the quality assurance and quality control procedures for the electrical corporation's risk assessment (refer to Section 6.4).*
- *Improving the risk analysis approach based on lessons learned during the WMP cycle (refer to Section 6.7)*

6.1.2 Summary of Risk Models

In this section, the electrical corporation must summarize the calculation approach for each risk and risk component identified in Section 6.2.1. This documentation is intended to provide a quick summary of the models used. The electrical corporation must provide the following information:

- **Identification (ID)**: Unique shorthand identifier for the risk or risk component.
- **Risk component:** Unique full identifier for the risk or risk component.
- **Design scenario(s)**: Reference to design scenarios evaluated with the model to calculate the risk or risk component. These must be defined in Section 6.3.
- **Key inputs**: List of key inputs used to evaluate the risk or risk component. These can be in summary form (e.g., the electrical corporation may list "equipment properties" rather than listing out equipment age, maintenance history, etc.).

- **Sources of inputs**: List of sources for each input parameter. These must include data sources (such as LANDFIRE) and modeling results (such as wind predictions) as relevant to the calculation of the risk or risk component. If the inputs come from multiple sources, each source should be on a new line.
- **Key outputs**: List of outputs calculated for the risk or risk component.
- **Units**: List of the units associated with the key outputs.

Table 6-1 provides a template for the required information. The electrical corporation must provide a summary of each model in Appendix B.

Table 6-1. Example of Summary of Risk Models

ID	Risk Component	Design Scenario(s)	Key Inputs	Source of Inputs (Data and/or Models)	Key Outputs	Units
R1	Overall utility risk	WL1, WL2, WL3 WV1, WV2, WV3	Ignition risk PSPS risk	See related models	Risk at a specific location, as granular as possible (i.e. circuit segment, pole)	(-)/year
R2	Ignition risk	WL1, WL2, WL3 WV1, WV2, WV3	Ignition likelihood Ignition consequence	See related models	Ignition risk at a specific location	(-)/year
R3	PSPS risk	WL1, WL2, WL3 WV1, WV2, WV3	PSPS likelihood PSPS consequence	See related models	PSPS risk at a specific location	(-)/year
IRC1	Ignition likelihood	WL1, WL2, WL3 WV1, WV2, WV3	Equipment likelihood of ignition Contact by vegetation likelihood of ignition Contact by object likelihood of ignition	See related models	Number of ignitions at a specific location	Ignitions/year
IRC2	Ignition consequence	WV1, WV2, WV3	Burn probability Wildfire consequence	See related models	Adverse effects at a specific location	(-)/ignition
IRC3	Wildfire consequence	WV1, WV2, WV3	Wildfire hazard intensity Wildfire exposure potential Wildfire vulnerability	See related models	Adverse effects at a specific location per wildfire	(-)/burned location
IRC4	PSPS consequence	WL1, WL2, WL3	PSPS exposure potential Vulnerability of community to PSPS	See related models	Adverse effects at a specific location per PSPS	(-)/de-energized location
FRC1	Equipment likelihood of ignition	WL1, WL2, WL3 WV1, WV2, WV3	Wind gust velocity Vegetation moisture	Weather model	Likelihood of equipment failure causing an ignition	ignitions/year
FRC1	Equipment likelihood of ignition	WL1, WL2, WL3 WV1, WV2, WV3	Equipment parameters Presence of mitigation	Asset database	Likelihood of equipment failure causing an ignition	ignitions/year
FRC1	Equipment likelihood of ignition	WL1, WL2, WL3 WV1, WV2, WV3	Current status Operating conditions	Data from inspections, work order history, and real-time monitoring systems	Likelihood of equipment failure causing an ignition	ignitions/year

ID	Risk Component	Design Scenario(s)	Key Inputs	Source of Inputs (Data and/or Models)	Key Outputs	Units
FRC2	Contact from vegetation likelihood of ignition	WL1, WL2, WL3 WV1, WV2, WV3	Wind gust velocity Vegetation moisture	Weather model	Likelihood of vegetation contact causing an ignition	ignitions/year
FRC2	Contact from vegetation likelihood of ignition	WL1, WL2, WL3 WV1, WV2, WV3	Vegetation parameters	Vegetation database	Likelihood of vegetation contact causing an ignition	ignitions/year
FRC2	Contact from vegetation likelihood of ignition	WL1, WL2, WL3 WV1, WV2, WV3	Current status	Data from inspections and vegetation treatment	Likelihood of vegetation contact causing an ignition	ignitions/year
FRC3	Contact from object likelihood of ignition	WL1, WL2, WL3 WV1, WV2, WV3	Wind gust velocity Vegetation moisture	Weather model	Likelihood of non-vegetation object contact causing an ignition	ignitions/year
FRC3	Contact from object likelihood of ignition	WL1, WL2, WL3 WV1, WV2, WV3	Historic risk events	Data from previous risk events	Likelihood of non-vegetation object contact causing an ignition	ignitions/year
FRC4	Burn probability	WV1, WV2, WV3	Topography	LANDFIRE	Likelihood of a fire reaching a location from a nearby but unknown ignition point	Occurrences/year
FRC4	Burn probability	WV1, WV2, WV3	Statistical profile of sustained wind speeds	Weather model	Likelihood of a fire reaching a location from a nearby but unknown ignition point	Occurrences/year
FRC4	Burn probability	WV1, WV2, WV3	Vegetation	LANDFIRE, adapted based on LiDAR (light detection and ranging) data	Likelihood of a fire reaching a location from a nearby but unknown ignition point	Occurrences/year
FRC5	Wildfire hazard intensity	WV1, WV2, WV3	Topography	LANDFIRE	Intensity of a fire at a specific location	HRR (heat release rate)/event Flame length/ event
FRC5	Wildfire hazard intensity	WV1, WV2, WV3	Sustained wind speeds	Weather model	Intensity of a fire at a specific location	HRR/event Flame length/ event

ID	Risk Component	Design Scenario(s)	Key Inputs	Source of Inputs (Data and/or Models)	Key Outputs	Units
FRC5	Wildfire hazard intensity	WV1, WV2, WV3	Vegetation	LANDFIRE, adapted based on LiDAR data	Intensity of a fire at a specific location	HRR/event Flame length/ event
FRC6	Wildfire exposure potential		Topography	LANDFIRE	Structures, people, and critical infrastructure at a specific location	Quantity/location
FRC6	Wildfire exposure potential		Land use	Remote sensing	Structures, people, and critical infrastructure at a specific location	Quantity/location
FRC6	Wildfire exposure potential		Population information	Census	Structures, people, and critical infrastructure at a specific location	Quantity/location
FRC7	Wildfire vulnerability		Vulnerable populations (AFN, limited English proficiency [LEP], elderly)	Census and surveys	Structures, people, and critical infrastructure at a specific location	Quantity/location
FRC7	Wildfire vulnerability		Land use	Remote sensing	Structures, people, and critical infrastructure at a specific location	Quantity/location
FRC7	Wildfire vulnerability		Critical infrastructure	Local municipalities	Structures, people, and critical infrastructure at a specific location	Quantity/location
FRC8	PSPS likelihood	WL1, WL2, WL3 WV1, WV2, WV3	Wind gust velocity Vegetation moisture	Weather model	Likelihood of PSPS at a specific location per year	Quantity/year
FRC8	PSPS likelihood	WL1, WL2, WL3 WV1, WV2, WV3	Equipment parameters Presence of mitigation	Asset database	Likelihood of PSPS at a specific location per year	Quantity/year
FRC8	PSPS likelihood	WL1, WL2, WL3 WV1, WV2, WV3	Current status Operating conditions	Data from inspections, work order history, and real-time monitoring systems	Likelihood of PSPS at a specific location per year	Quantity/year
FRC9	Vulnerability of community to PSPS		Vulnerable populations (AFN, LEP, elderly)	Census and surveys	Structures, people, and critical infrastructure at a specific location	Quantity/location
FRC9	Vulnerability of community to PSPS		Land use	Remote sensing	Structures, people, and critical infrastructure at a specific location	Quantity/location
FRC9	Vulnerability of community to PSPS		Critical infrastructure	Local municipalities	Structures, people, and critical infrastructure at a specific location	Quantity/location

6.2 Risk Analysis Framework

In this section of the WMP, the electrical corporation must provide a high-level overview of its risk analysis framework. This includes a summary of key modeling assumptions, input data, and modeling tools used.

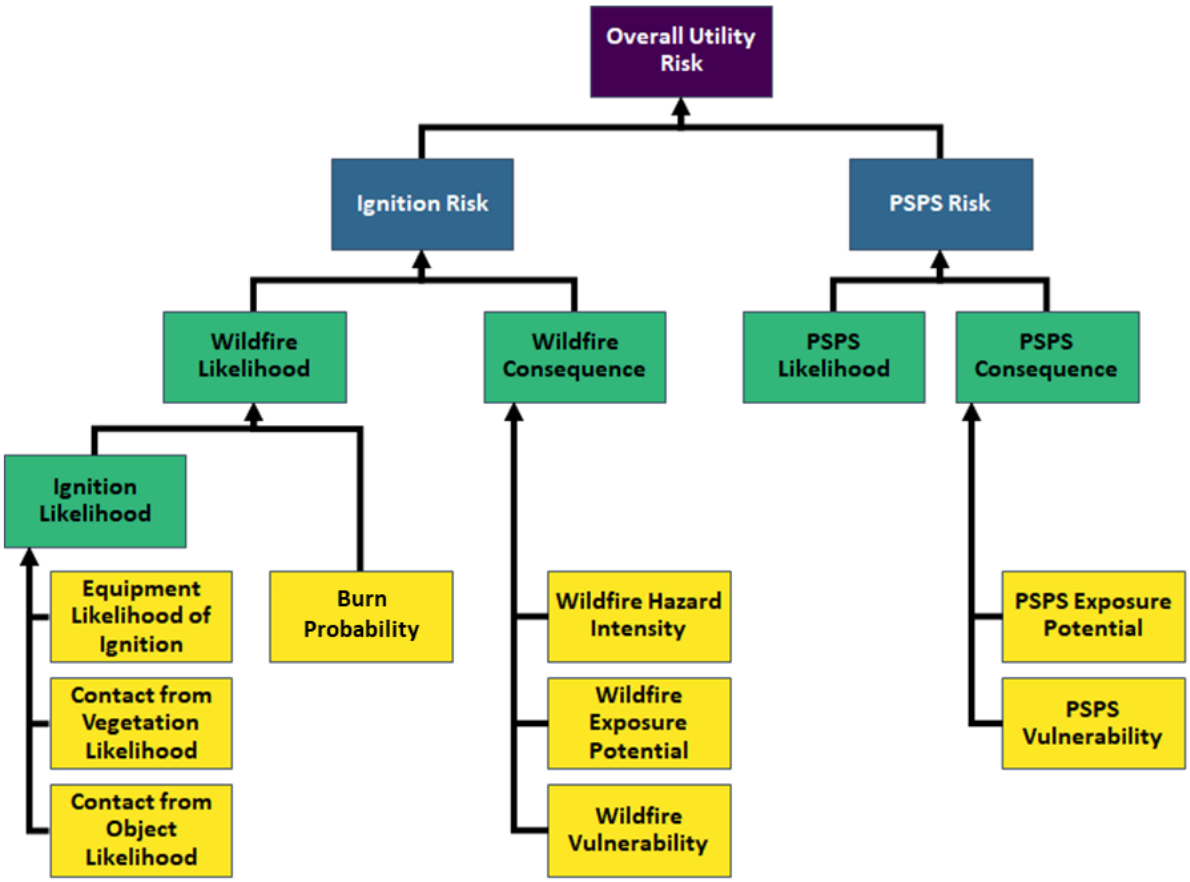
At a minimum, the electrical corporation must evaluate the impact of the following factors on the quantification of risk:

- **Equipment / Assets** (e.g., type, age, inspection, maintenance procedures, etc.)
- **Topography** (e.g., elevation, slope, aspect, etc.)
- **Weather** (at a minimum this must include statistically extreme conditions based on weather history and seasonal weather)
- **Vegetation** (e.g., type/class/species/fuel model, canopy height/base height/cover, growth rates, moisture content, inspection, clearance procedures, etc.)
- **Climate change** (e.g., long-term changes in seasonal weather; statistical extreme weather; impact of change on vegetation species, growth, moisture, etc.) at a minimum, this must include adaptations of historical weather data to current and forecasting future climate
- **Social vulnerability** (e.g., AFN, socioeconomic factors, etc.)
- **Physical vulnerability** (e.g., people, structures, critical facilities/infrastructure, etc.)
- **Coping capacities** (e.g., limited access/egress, etc.)

6.2.1 Risk and Risk Component Identification

In this section, the electrical corporation must provide a brief narrative and one or more simple graphics describing the framework that defines its overall utility risk. At a minimum, the electrical corporation must define its overall utility risk as the comprehensive risk due to both wildfire and PSPS events across its service territory. This includes several likelihood and consequence risk components that are aggregated based on the framework shown in Figure 6-1 below. The following paragraphs define each risk component.

Figure 6-1. Composition of Overall Utility Risk



While the overall utility risk framework and associated risk components identified in Section 6.2 are the minimum requirements for determining overall utility risk, the electrical corporation may elect to include additional risk components as needed to better define risk for its service territory. Where the electrical corporation identifies additional terms as part of its risk framework, it must define those terms. The electrical corporation must include a schematic demonstrating its adopted risk framework (similar to Figure 6-1), including any components beyond minimum requirements.

As shown in Figure 6-1, overall utility risk is broken down into two individual hazard risks:

- **Ignition risk:** The total expected annualized impacts from ignitions at a specific location. This considers the likelihood that an ignition will occur, the likelihood the ignition will transition into a wildfire, and the potential consequences—considering hazard intensity, exposure potential, and vulnerability—the wildfire will have for each community it reaches

- **PSPS risk**: The total expected annualized impacts from PSPS at a specific location. This considers two factors: (1) the likelihood a PSPS will be required due to environmental conditions exceeding design conditions, and (2) the potential consequences of the PSPS for each affected community, considering exposure potential and vulnerability

The individual hazard risks are further broken down into 14 risk components. These risk components are split into two categories, intermediate and fundamental. Fundamental risk components are the smallest components of risk that the electrical corporation must determine as part of its risk analysis. Intermediate risk components are the likelihood and consequence related to each hazard. Each fundamental or intermediate risk component provides valuable insight in an electrical corporation's wildfire and PSPS risk calculations.

There are a minimum of five intermediate risk components:

- **Ignition likelihood:** The total anticipated annualized number of ignitions resulting from electrical corporation-owned assets at each location in the electrical corporation's service territory. This considers probabilistic weather conditions, type and age of equipment, and potential contact of vegetation and other objects with electrical corporation assets. This should include the use of any method used to reduce the likelihood of ignition. For example, the use of protective equipment and device settings to reduce the likelihood of an ignition upon an initiating event.
- **Wildfire likelihood:** The total anticipated annualized number of fires reaching each spatial location resulting from utility-related ignitions at each location in the electrical corporation service territory. This considers the ignition likelihood and the likelihood that an ignition will transition into a wildfire based on the probabilistic weather conditions in the area.
- **Wildfire consequence:** The total anticipated adverse effects from a wildfire on each community it reaches. This considers the wildfire hazard intensity, the wildfire exposure potential, and the inherent wildfire vulnerabilities of communities at risk (see definitions in the following list).
- **PSPS likelihood**: The likelihood of an electrical corporation requiring a PSPS given a probabilistic set of environmental conditions.
- **PSPS consequence:** The total anticipated adverse effects from a PSPS for a community. This considers the PSPS exposure potential and inherent PSPS vulnerabilities of communities at risk (see definitions in the following list).

There are a minimum of nine fundamental risk components:

- **Equipment ignition likelihood:** The likelihood that electrical corporation-owned equipment will cause an ignition either through normal operation (such as arcing) or through failure.
- **Contact from vegetation ignition likelihood:** The likelihood that vegetation will contact electrical corporation-owned equipment and result in an ignition.
- **Contact by object ignition likelihood:** The likelihood that a non-vegetative object (such as a balloon or vehicle) will contact electrical corporation-owned equipment and result in an ignition.
- **Burn probability:** The likelihood that a wildfire with a nearby but unknown ignition point will burn a specific location within the service territory based on a probabilistic set of weather profiles, vegetation, and topography.
- **Wildfire hazard intensity:** The potential intensity of a wildfire at a specific location within the service territory given a probabilistic set of weather profiles, vegetation, and topography.
- **Wildfire exposure potential:** The potential physical, social, or economic impact of wildfire on people, property, critical infrastructure, livelihoods, health, environmental services, local economies, cultural/historical resources, and other high-value assets. These may include direct or indirect impacts, as well as short- and long-term impacts.
- **Wildfire vulnerability:** The susceptibility of people or a community to adverse effects of a wildfire, including all characteristics that influence their capacity to anticipate, cope with, resist, and recover from the adverse effects of a wildfire (e.g., access and functional needs customers, Social Vulnerability Index, age of structures, firefighting capacities).
- **PSPS exposure potential:** The potential physical, social, or economic impact of a PSPS event on people, property, critical infrastructure, livelihoods, health, local economies, and other high-value assets.
- **Vulnerability of community to PSPS (PSPS vulnerability):** The susceptibility of people or a community to adverse effects of a PSPS event, including all characteristics that influence their capacity to anticipate, cope with, resist, and recover from the adverse effects of a PSPS event (e.g., high AFN population, poor energy resiliency, low socioeconomics).

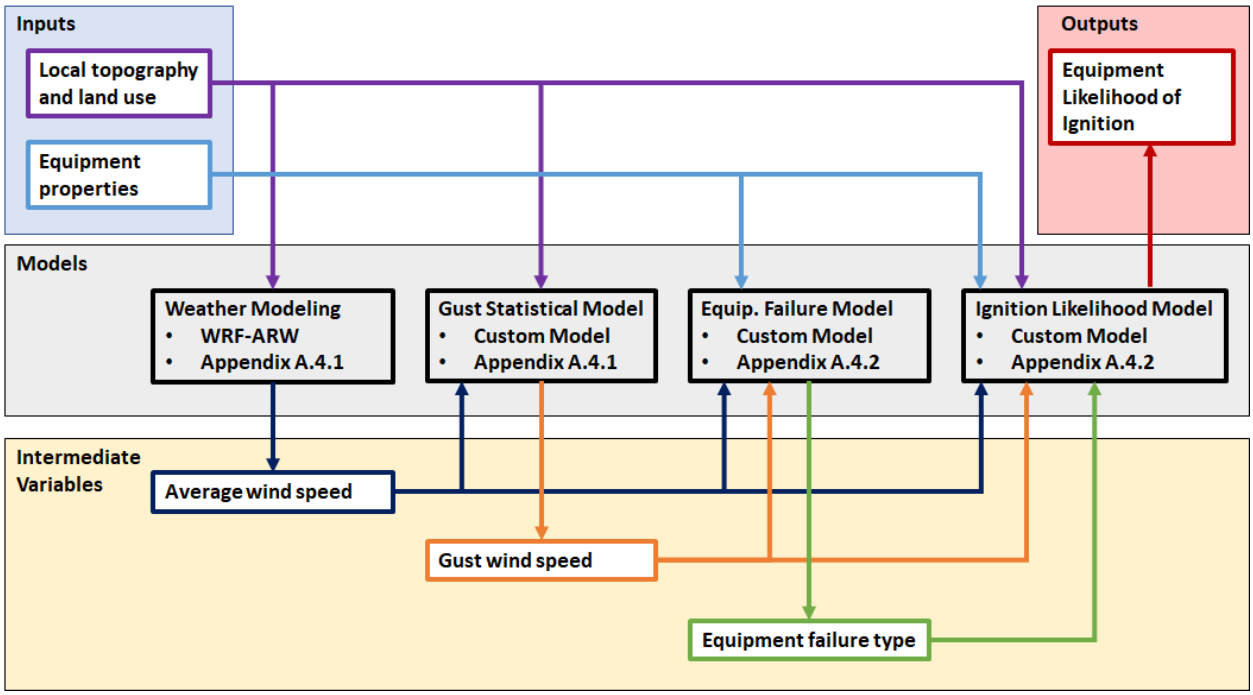
The electrical corporation must adopt these definitions in this section of the WMP. If the electrical corporation considers additional intermediate and fundamental risk components, it must define those components in this section as well.

6.2.2 Risk and Risk Components Calculation

The electrical corporation must calculate each risk and risk component defined in Section 6.2.1. Appendix B, "Calculation of Risk and Risk Components," provides additional requirements on these calculations. These are the minimum requirements and are intended to establish the baseline evaluation and reporting of all electrical corporations. If the electrical corporation identifies other key factors as important, it must report them in the WMP in a similar format.

The electrical corporation must provide schematics illustrating the calculation of each risk and risk component as necessary to demonstrate the logical flow from input data to outputs, including separate items for any intermediate calculations. Figure 6-2 provides an example of a calculation schematic for the equipment likelihood of ignition.

Figure 6-2. Example of a Calculation Schematic



The electrical corporation must summarize any differences between its calculation of these risk components and the requirements of these Guidelines. These differences may include any of the following:

- **Additional input parameters** beyond the minimum requirements for a specific risk component
- **Calculations of additional outputs** beyond the minimum requirements for a specific risk component
- **Calculations of additional risk components** defined by the electrical corporation in Section 6.2.1

The process used to combine risk components must be summarized for each relevant risk component. This process must align with applicable CPUC decisions regarding the inclusion of Risk Assessment and Mitigation Phase (RAMP) filings. If scaling factors (such as multi-attribute value functions [MAVFs] or representative cost) are used in this combination, the electrical corporation must present a table with all relevant information needed to understand this procedure. The electrical corporation must organize this discussion into the following two subsections focusing on likelihood and consequence.

6.2.2.1 Likelihood

The electrical corporation must discuss how it calculates the likelihood that its equipment (through normal operations or failure) will result in a catastrophic wildfire and the resulting likelihood of issuing a PSPS. The risk components discussed in this section must include at least the following:

- Ignition likelihood
    - Equipment failure likelihood of ignition
    - Contact from vegetation likelihood of ignition
    - Contact from object likelihood of ignition
- Burn probability
- PSPS likelihood

6.2.2.2 Consequence

The electrical corporation must discuss how it calculates the consequences of a fire originating from its equipment and the consequence of implementing a PSPS event. The risk components discussed in this section must include at least the following:

- Wildfire consequence
- Wildfire hazard intensity

- Wildfire exposure potential
- Wildfire vulnerability
- PSPS consequence
- PSPS exposure potential
- PSPS vulnerability

6.2.2.3 Risk

The electrical corporation must discuss how it calculates each risk and the resulting overall utility risk defined in Section 6.2.1. The discussion in this section must include at least the following:

- Ignition risk
- PSPS risk
- Overall utility risk

6.2.3 Key Assumptions and Limitations

Because the individual elements of risk assessment are interdependent, the interfaces between the various risk models and mitigation initiatives must be internally consistent. In this section of the WMP, the electrical corporation must discuss key assumptions, limitations, and data standards for the individual elements of its risk assessment. This must include the following:

- **Key modeling assumptions** made specific to each model to represent the physical world and to simplify calculations
- **Data standards,** which must be consistently defined (e.g., weather model predictions at a 30-ft [10-m] height must be converted to the correct height for fire behavior predictions, such as mid-flame wind speeds)
- **Consistency of assumptions and limitations** in each interconnected model, which must be traced from start to finish, with any discrepancies between models discussed
- **Stability of assumptions in the program**, including historical and projected changes

More mature programs regularly monitor and evaluate the scope and validity of modeling assumptions. Monitoring and evaluation categories may include:

- **Adaptation of weather history** to current and forecasted climate conditions

- **Availability of suppression resources** including type, number of resources, and ease of access to incident location
- **Height of wind driving fire spread** / wind adjustment factor calculation
- **General equipment failure rates** / wind speed functional dependence for unknown components
- **General vegetation contact rates** / wind speed functional dependence for unknown species
- Height of electrical equipment in the service territory
- **Stability of the atmosphere** and resulting calculation of near-surface winds
- **Vegetative fuels** and fuel models including adaptations based on fuel management activities by other Public Safety Partners
- **Combination of risk components / weighting of attributes** in alignment with most recent decision issued by the CPUC for inclusion in RAMP filings
- **Wind load capacity for electrical equipment** in the service territory
- **Number, extent, and type of community assets at risk** in the service territory
- **Proxies for estimating impact on customers and communities** in the service territory
- **Extent, distribution, and characteristics of vulnerable populations** in the service territory

The electrical corporation must document each assumption in Table 6-2. The electrical corporation must summarize detailed assumptions made within models in accordance with the model documentation requirements in Appendix B.

Table 6-2. Example of Risk Modeling Assumptions and Limitations

Assumption	**Justification**	**Limitation**	**Applicable Models**
Height of conductors in rural and highly rural areas is assumed to be 28 feet	GO 95 requires 34 feet or 30 feet over railroads or thoroughfares for 35-kV lines. The sag in the lines in our service territory generally varies from 3 to 10 feet. The average height of conductors is thus: 34 feet – 6 feet = 28 feet	Statute mandates minimum clearance, but the height could be higher. Since wind speed generally increases with height, this could lead to use of non-conservative wind speeds in design.	Each likelihood-of-ignition model

6.3 Risk Scenarios

In this section of the WMP, the electrical corporation must provide a high-level overview of the scenarios to be used in its risk analysis in Section 6.2. These must include at least the following:

- **Design basis scenarios** that will inform the electrical corporation's long-term wildfire mitigation initiatives and planning
- **Extreme-event scenarios** that may inform the electrical corporation's decisions to provide added safety margin and robustness

The risk scenarios described in Sections 6.3.1 and 6.3.2 below are the minimum scenarios the electrical corporation must assess in its wildfire and PSPS risk analysis. The electrical corporation must also describe and justify any additional scenarios it evaluates.

Each scenario must consider:

- **Local relevance:** Heterogeneous conditions (e.g., assets, equipment, topography, vegetation, weather) that vary over the landscape of the electrical corporation's service territory at a level sufficiently granular to permit understanding of the risk at a specific location or for a specific circuit segment. For example, statistical wind loads must be calculated based on wind gusts considering the impact of nearby topographic and environmental features, such as hills, canyons, and valleys
- **Statistical relevance:** Percentiles used in risk scenario selection must consider the statistical history of occurrence and must be designed to describe a reasonable return interval / probability of occurrence. For example, designing to a wind load with a 10,000-year return interval may not be desirable as most conductors in the service territory would be expected to fail (i.e., the scenario does not help discern which areas are at elevated risk)

6.3.1 Design Basis Scenarios

Fundamental to any risk assessment is the selection of one or more relevant design basis scenarios (design scenarios). These scenarios will inform long-term mitigation initiatives and planning. In this section, the electrical corporation must identify the design scenarios it has prioritized from a comprehensive set of possible scenarios. The scenarios identified must be based on the unique wildfire and PSPS risk characteristics of the electrical corporation's service territory and achieve the primary goal and stated plan objectives of its WMP. At a

minimum, the following design scenarios representing statistically relevant weather and vegetative conditions must be considered throughout the service territory.

For wind loading on electrical equipment, the electrical corporation must use at least four statistically relevant design conditions. It must calculate wind loading based on locally relevant 3-second wind gusts over a 30-year wind speed history during fire season in its service territory. The conditions are the following:

- **Wind Load Condition 1: Baseline:** The baseline wind load condition the electrical corporation use in design, construction, and maintenance relative to GO 95, Rule 31.1.
- **Wind Load Condition 2: Very High:** 95th-percentile wind gusts based on maximum daily values over the 30-year history. This corresponds to a probability of exceedance of 5 percent on an annual basis (i.e., 20-year return interval) and is intended to capture annual high winds observed in the region (e.g., Santa Ana winds).
- **Wind Load Condition 3: Extreme:** Wind gusts with a probability of exceedance of 5 percent over the three-year WMP cycle (i.e., 60-year return interval).
- **Wind Load Condition 4: Credible Worst Case:** Wind gusts with a probability of exceedance of 1 percent over the three-year WMP cycle (i.e., 300-year return interval).

The data and/or models the electrical corporation uses to establish locally relevant wind gusts for these design conditions must be documented in accordance with the weather analysis requirements described in Appendix B.

For weather conditions used in calculating fire behavior, the electrical corporation must use probabilistic scenarios based on a 30-year history of fire weather. This approach must consider a range of wind speeds, directions, and fuel moistures that are representative of historic conditions. In addition, the electrical corporation must discuss how this weather history is adapted to align with current and forecasted climate conditions. The electrical corporation must consider the following two conditions:

- **Weather Condition 1: Anticipated Conditions:** The statistical weather analysis is limited to fire seasons expected to be the most relevant to the next three years of the WMP cycle.
- **Weather Condition 2: Long-Term Conditions:** The statistical weather analysis is representative of fire seasons covering the full 30-year history.

The electrical corporation must state how it defines “fire weather” and “fire season” for the calculations of these probabilistic scenarios.

One possible approach to the statistical weather analysis for fire behavior is Monte- Carlo simulation of synthetic fire seasons in accordance with approaches presented by the United States Forest Service.[11, 12] However, the electrical corporation must justify the selection of locally relevant data for use in this approach (i.e., Remote Automated Weather Systems data or historic weather reanalysis must be locally relevant). The data and/or models the electrical corporation uses to establish locally relevant weather data for these designs must be documented in accordance with the weather analysis requirements described in Appendix B.

For vegetative conditions not including short-term moisture content, the electrical corporation must use design scenarios including the current and forecasted vegetative type and coverage. The conditions it must consider include the following:

- **Vegetation Condition 1: Existing Fuel Load:** The wildfire hazard must be evaluated with the existing fuel load within the service territory, including existing burn scars and fuel treatments that reduce the near-term fire hazard.
- **Vegetation Condition 2: Short-Term Forecasted Fuel Load:** The wildfire hazard must be evaluated considering the changes in expected fuel load over the three-year Base WMP cycle (2023-2025). At a minimum, this must include regrowth of previously burned and treated areas.
- **Vegetation Condition 3: Long-Term Extreme Fuel Load:** The wildfire hazard must be evaluated considering the long-term potential changes in fuels throughout the service territory. This must include, at a minimum, regrowth of previously burned and treated areas and changes in predominant fuel types.

The data and/or models the electrical corporation uses to establish locally relevant fuel loads for these designs must be documented in accordance with the vegetation requirements described in Appendix B.

The electrical corporation must provide a brief narrative on the design basis scenarios used in its risk analysis. If the electrical corporation includes additional design scenarios, it must

[11] M. A. Finney, I. C. Grenfell, C. W. McHugh, R. C. Seli, D. Trethewey, R. D. Stratton, and S. Brittain, 2011, "A Method for Ensemble Wildland Fire Simulation," *Environmental Modeling & Assessment* 16, no. 2: 153–167.
[12] M. A. Finney, C. W. McHugh, I. C. Grenfell, K. L. Riley, and K. C. Short, 2011, "A Simulation of Probabilistic Wildfire Risk Components for the Continental United States," *Stochastic Environmental Research and Risk Assessment* 25: 973–1000.

describe these scenarios and their purpose in the analysis. In addition, the electrical corporation must provide a table summarizing the following information:

- Identification of each design basis scenario (e.g., Scenario 1, Scenario 2)
- Components of each scenario (e.g., Weather Condition 1, Vegetation Condition 1)
- Purpose of each scenario

Table 6-3 provides an example.

Table 6-3. Example of Summary of Design Basis Scenarios

Scenario ID	Design Scenario	Purpose
WL1	Wind Load 1	Ignition likelihood calculation
WL2	Wind Load 2	Ignition likelihood calculation
WL3	Wind Load 3	Ignition likelihood calculation
WL4	Wind Load 4	Ignition likelihood calculation
WV4	Weather Condition 1 Vegetation Condition 1	Year 1 fire behavior calculation
WV5	Weather Condition 1 Vegetation Condition 2	Year 2–3 fire behavior calculation
WV6	Weather Condition 2 Vegetation Condition 3	Long-term fire behavior calculation

6.3.2 Extreme-Event/High Uncertainty Scenarios

In this section, the electrical corporation must identify extreme-event/high-uncertainty scenarios that it considers in its risk analysis. These generally include the following types of scenarios:

- Longer-term scenarios with higher uncertainty (e.g., climate change impacts, population migrations, extended drought)
- Multi-hazard scenarios (e.g., ignition from another source during a PSPS)
- High-consequence but low-likelihood ("Black Swan") events (e.g., acts of terrorism, 10,000-year weather)

While the primary risk analysis is intended to be based on the design scenarios discussed in Section 6.3.1, the potential for high consequences from extreme events may provide additional insight into the mitigation prioritization described in Section 7.

The electrical corporation must provide a brief narrative on the extreme-event scenarios used in its risk analysis. The electrical corporation must describe these scenarios and their purpose in the analysis. In addition, the electrical corporation must provide a table summarizing the following information:

- Identification of each extreme-event risk scenario (e.g., Scenario 1, Scenario 2)
- Components of each scenario (e.g., Weather Condition 1, Vegetation Condition 1)
- Purpose of the scenario

Table 6-4 provides an example of the minimum acceptable level of information.

Table 6-4. Example of Summary of Extreme-Event Scenarios

Scenario ID	**Extreme-Event Scenario**	**Purpose**
ES1	Climate Change 1 Weather Condition 2 Vegetation Condition 3	Impact of climate change on long-term fire behavior calculation

6.4 Risk Analysis Results and Presentation

In this section of the WMP, the electrical corporation must present a high-level overview of the risks calculated using the approaches discussed in Section 6.2 for the scenarios discussed in Section 6.3.

The risk presentation must include the following:

- Summary of electrical corporation-identified high fire risk areas in the service territory
- Geospatial map of the top risk areas within the High Fire Risk Area (HFRA) (i.e., areas that the electrical corporation has deemed at high risk from wildfire independent of HFTD designation)
- Narrative discussion of proposed updates to the HFTD
- Tabular summary of top risk-contributing circuits across the service territory
- Tabular summary of key metrics across the service territory

The following subsections expand on the requirements for each of these.

6.4.1 Top Risk Areas within the HFRA

In this section, the electrical corporation must identify top risk areas within its self-identified HFRA, compare these areas to the CPUC's current HFTD, and discuss how it plans to submit its proposed changes to the CPUC for review.

6.4.1.1 Geospatial Maps of Top-Risk Areas within the HFRA

The electrical corporation must evaluate the outputs from its risk modeling to identify top risk areas within its HFRA (independent of where they fall with respect to the HFTD). The electrical corporation must provide geospatial maps of these areas.

The maps must fulfill the following requirements:

- **Risk levels:** Levels must be selected to show at least three distinct levels, with the values based on the following:
  - Top 5 percent of overall utility risk values in the HFRA
  - Top 5 to 20 percent of overall utility risk values in the HFRA
  - Bottom 80 percent of overall utility risk values in the HFRA
- **Colormap:** The colormap of the risk levels must meet accessibility requirements (recommended colormap is Viridis)

- **County lines:** The map must include county lines as a geospatial reference
- **HFTD tiers:** The map must show a comparison with existing HFTD Tiers 2 and 3 regions.

6.4.1.2 Proposed Updates to the HFTD

In this section, the electrical corporation must discuss the differences between the electrical corporation-identified top-risk areas within the HFRA and the existing CPUC-approved HFTD. The electrical corporation must identify areas that its risk analysis indicates are at a higher risk than indicated in the current HFTD. The electrical corporation must also describe its process for submitting proposed changes to the HFTD to the CPUC, if such changes are desired; the electrical corporation need not conclude that the HFTD should be modified. Any proposed changes to the HFTD must be mapped in accordance with the requirements in the previous sub-section.

6.4.2 Top Risk-Contributing Circuits/Segments/Spans

The electrical corporation must provide a summary table showing the highest-risk circuits, segments, or spans[13] within its service territory. The table should include the following information about each circuit:

- **Circuit, Segment, or Span ID:** Unique identifier for the circuit, segment, or span
- **Overall utility risk scores:** Numerical value for each risk
- **Top risk contributors:** The risk components that lead to the high risk on the circuit

The electrical corporation must rank its circuits, segments, or spans by circuit-mile-weighted overall utility risk score and identify each circuit, segment, or span that significantly contributes to risk. A circuit/segment/span significantly contributes to risk if it:

1. Individually contributes more than 1 percent of the total overall utility risk; or
2. Is in the top 5 percent of highest risk circuits/segments/spans when all circuits/segments/spans are ranked individually from highest to lowest risk.

The electrical corporation must include each circuit, segment, or span that significantly contributes to risk in the table below.[14]

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[13] For the section, the electrical corporation may use either circuits, segments, or spans, whichever is more appropriate considering the granularity of its risk model(s).
[14] This table is a summary of information provided in the QDR. As such, information included in this table must align with the QDR.

Table 6-5. Example of Summary of Top-Risk Circuits, Segments, or Spans

Risk Ranking	Circuit, Segment, or Span ID	Overall Utility Risk Score	Ignition Risk Score	PSPS Risk Score	Top Risk Contributors
1	ID001				
2	ID002				

Note: Once populated, if this table is longer than two pages, the electrical corporation must append the table.

6.4.3 Other Key Metrics

The electrical corporation must calculate, track, and present on several other key metrics of risk across its service territory. These include, but are not limited to the frequency of:

- **High Fire Potential Index (FPI):** The electrical corporation must specify whether it calculates its own FPI or uses an external source, such as the United States Geological Survey.[15]
- **Red Flag Warning (RFW)**
- **High Wind Warning (HWW)**

For each metric, the frequency of its occurrence within each HFTD tier and the HFRA must be reported in the table below. The metric must be reported in number of overhead circuit mile (OCM) days of occurrence normalized by circuit miles within that area type. For example, consider an electrical corporation with 1,000 OCM in HFTD Tier 3. If 100 of these OCM are under a RFW for one day, and 10 of those OCM are under a RFW for an additional day, then the average RFW-OCM per OCM would be:

$$\frac{RFW\_OCM}{OCM} = \frac{(100 \times 1 + 10 \times 1)}{1000} = 0.1$$

[15] United States Geological Survey Fire Danger Map and Data Products Web Page (accessed Oct. 27, 2022): https://firedanger.cr.usgs.gov/viewer/index.html.

This metric represents the average RFW-OCM experienced by an OCM within the electrical corporation's service territory within HFTD Tier 3. If the metric is continuous (such as FPI), the report should include a note stating the threshold used to select high values. Table 6-6 provides a template for reporting the required information.

Table 6-6. Example of Summary of Key Metrics by Statistical Frequency

Metric	**Non-HFTD**	**HFTD Tier 2**	**HFTD Tier 3**	**Non-HFRA**	**HFRA**
FPI-OCM/ OCM					
RFW-OCM/ OCM					
HWW-OCM/ OCM					

6.5 Enterprise System for Risk Assessment

In this section, the electrical corporation must provide an overview of inputs to, operation of, and support for a centralized wildfire and PSPS risk assessment enterprise system. This overview must include discussion of:

- The electrical corporation's database(s) used for storage of risk assessment data.
- The electrical corporation's internal documentation of its database(s).
- Integration with systems in other lines of business.
- The internal procedures for updating the enterprise system including database(s).
- Any changes to the initiative since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation.

6.6 Quality Assurance and Control

The electrical corporation must document the procedures it uses to confirm that the data collected and processed for its risk assessment are accurate and comprehensive. This includes but is not limited to model, sensor, inspection, and risk event data used as part of the electrical corporation's WMP program. In this section of the WMP, the electrical corporation must describe the following:

- **Independent review:** Role of independent third-party review in the data and model quality assurance
- **Model controls, design, and review:** Overview of the quality controls in place on electrical corporation risk models and sub-models

6.6.1 Independent Review

The electrical corporation must report on its procedures for independent review of data collected (e.g., through sensors or inspections) and generated (e.g., through risk models and software) to support decision making. In this section of the WMP, the electrical corporation must provide the following:

- **Independent reviews:** The electrical corporation's procedures for conducting independent reviews of data collection and risk models.
- **Additional review triggers:** The electrical corporation's internal procedures to identify when a third-party review is required beyond the routinely scheduled reviews.

- **Results, recommendations, and disposition:** The results and recommendations from the electrical corporation's most recent independent review of its data collection and risk models. This includes the electrical corporation's disposition of each comment.
- **Routine review schedule:** The electrical corporation's routine review schedule.

The electrical corporation must enter each accepted recommendation from independent review into its action tracking system for resolution (assignment of responsibility, development of technical plan, schedule for development and deployment, etc.) in accordance with the requirements discussed in Section 11.

6.6.2 Model Controls, Design, and Review

An electrical corporation's risk modeling approaches are complex, with several layers of interaction between models and sub-models. If these models are designed as a single unit, it can be difficult to evaluate the propagation of small changes in assumptions or inputs through the models. The requirements in this section are designed to facilitate the review of models by the stakeholders and Energy Safety, and to allow for more comprehensive retrospective analysis of failures in the system.

The electrical corporations must report on its risk modeling software's model controls, design, and review in the following areas:

- **Modularization:** The electrical corporation must report on the degree to which its software architecture is sufficiently modular to track and control changes and enhancements over time. At a minimum, the electrical corporation must report if it has separate modules to evaluate each of the following:
  - Weather analysis
  - Fire behavior analysis
  - Seasonal vegetation analysis
  - Equipment failure
  - Exposure and vulnerability analysis
- **Reanalysis:** The electrical corporation must describe its capability to provide the results of its risk model based on the operational version of the software (including code and data) on a specific historic day.

- **Version control:** The electrical corporation must report on how it conforms to industry standard practices in version controlling its risk model and sub-models. At a minimum, the electrical corporation is expected to report on:
  - Models and software version controls aligned with industry standard programs, procedures, and protocols
  - Version control of model input data, including geospatial data layers
  - Procedures for updating technical, verification, and validation documentation.

6.7 Risk Assessment Improvement Plan

A key objective of the WMP review process is to drive year-over-year continuous improvement. In this section, the electrical corporation must provide a high-level overview of its plan to improve both programmatic and technical aspects of its risk assessment in at least four key areas:

- **Risk assessment methodology:** Wildfire and PSPS risk assessment methodology and its documentation, including both quantitative and qualitative approaches
- **Design basis:** Justification of design basis scenarios used to evaluate the risk and its documentation
- **Risk presentation:** Presentation of risk to stakeholders, including dashboards and statistical assessments
- **Risk event tracking:** Tracking and reconstruction of risk events and integration of lessons learned

The overview must consist of the following information, in tabulated format:

- **Key area:** One of the four key areas identified above
- **Title of proposed improvement:** Brief heading or subject of the improvement
- **Type of improvement:** Technical or programmatic
- **Anticipated benefit:** Summary of anticipated benefit and any other impacts of the proposed improvement
- **Timeframe and key milestones:** Total timeframe for undertaking the proposed improvement and any key milestones

Table 6-7 provides an example of the minimum acceptable level of information.

In addition, the electrical corporation must provide a concise narrative of its proposed improvement plan (maximum of five pages per improvement) summarizing:

- **Problem statement:** Description of the current state of the problem to be addressed
- **Planned improvement:** Discussion of the planned improvement, including any new/novel strategies to be developed and the timeline for their completion
- **Anticipated benefit:** Detailed description of the anticipated benefit and any other impacts of the proposed improvement
- **Region prioritization (where relevant):** Reference to risk-informed analysis (e.g., local validation of weather forecasts in the HFTD) demonstrating that high-risk areas are being prioritized for continued improvement
- **Supporting documentation (as necessary)**

Table 6-7. Example of Utility Risk Assessment Improvement Plan

Key Risk Assessment Area	Proposed Improvement	Type of Improvement	Expected Value Add	Timeframe and Key Milestones
RA-1, risk assessment methodology	RA-1-A. Increase validation of local wind gusts in statistical weather modeling in the HFTD.		Improved likelihood-of-ignition calculations.	Pilot system, 2023–2024 Integrate system throughout HFTD, 2024–2026
RA-1, risk assessment methodology	RA-1-B. Develop verification and validation documentation for ignition models.		Improved quantitative understanding of the accuracy of the sub-models. This will help identify where our model has the highest areas of uncertainty that need to be addressed in future activities.	Conduct initial development, 2023 Expand validation basis, 2024–2026
RA-2, design basis				
RA-3, risk presentation				
RA-4, risk event tracking				

7. Wildfire Mitigation Strategy Development

In this section of the WMP, the electrical corporation must provide a high-level overview of its risk evaluation and process for deciding on a portfolio of mitigation initiatives to achieve maximum feasible[16] risk reduction and that meet the goal(s) and plan objectives stated in Sections 4.1–4.2, and wildfire mitigation strategy for 2023-2025. Sections 7.1 and 7.2 below provide detailed instructions.

7.1 Risk Evaluation

7.1.1 Approach

In this section of the WMP, the electrical corporation must provide a brief narrative of its risk evaluation approach, based on the risk analysis outcomes presented in Section 6, to help inform the development of a wildfire mitigation strategy that meets the goal(s) and plan objectives stated in Sections 4.1– 4.2.

The electrical corporation must describe the risk evaluation approach in a maximum of two pages, inclusive of all narratives, bullet point lists, and any graphics.

The following is an example of this description:

The risk evaluation approach in this WMP is designed to meet a range of industry-recognized standards (e.g., ISO 31000), best practices, and research[17] to determine a wildfire and PSPS risk mitigation strategy. The intent is to use this approach to help inform [electrical corporation]'s development of a portfolio of wildfire mitigation initiatives and activities that meet the goals and objectives stated in Sections 4.1– 4.2. Therefore, the general risk evaluation approach consists of the following:

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[16] "Maximum feasible" means, in accordance with Public Utilities Code section 326(a)(2), capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

[17] T. Aven, 2012, *Foundations of Risk Analysis*, 2nd ed. John Wiley and Sons, West Sussex, United Kingdom.

- *Identify key stakeholder groups, decision-making roles and responsibilities, and engagement process.*
- *Identify risk evaluation criteria based on the balance of various performance goals. Apply these criteria to monitor the effectiveness of the electrical corporation's WMP in achieving its identified goals and objectives.*
- *Evaluate wildfire and PSPS risks and risk components described in Section 4 against the risk evaluation criteria, considering both potential positive and potential negative outcomes. Apply the results from the evaluation of wildfire and PSPS risks within [electrical corporation]'s service territory within a risk-informed decision-making process to develop prioritized areas where mitigation initiatives are necessary.*
- *Identify a portfolio of wildfire mitigation initiatives and activities, prioritized by risk. Identify and characterize potential mitigation approaches for each.*
- *Perform an integrated evaluation of the identified potential risk mitigation initiatives. The outcome is the specification of a portfolio of mitigation initiatives that will be implemented over the WMP cycle.*
- *Provide a summary of the approved risk mitigation strategies for inclusion in the WMP submission. This summary must include schedules for implementation of the strategies, procedures for management oversight of implementation of the mitigations, and methods of evaluation of their effectiveness once deployed.*
- *Discuss the expected improvements in maturity and describe monitoring activities to assess the degree of improvement in maturity.*

7.1.2 Key Stakeholders for Decision Making

In this section, the electrical corporation must identify all key stakeholder groups that are part of the decision-making process for developing and prioritizing mitigation initiatives. Table 7-1. Example of Stakeholder Roles and Responsibilities in the Decision-Making Process provides an example of the required information. At a minimum, the electrical corporation must do the following:

- Identify each key stakeholder group (e.g., electrical corporation executive leadership, the public, state/county public safety partners)
- Identify the decision-making role of each stakeholder group (e.g., decision maker, consulted, informed)
- Identify method of engagement (e.g., meeting, workshop, written comments)

The electrical corporation must also describe how it communicates decisions to the identified key stakeholders.

Table 7-1. Example of Stakeholder Roles and Responsibilities in the Decision-Making Process

Stakeholder	Stakeholder Point of Contact	Electrical Corporation Point of Contact	Stakeholder Role	Engagement Methods
County	Director of Emergency Management	Director of Transmission / Distribution Northeast Region	• County provides electrical corporation with information on infrastructure improvements • Electrical corporation provides information on wildfire mitigations within county	• Monthly phone conversations • Quarterly public meetings

7.1.3 Risk-Informed Prioritization

In making decisions risk mitigation, the electrical corporation must identify and evaluate where it can make investments and take actions to reduce its overall utility risk. The electrical corporation must develop a prioritization list based on overall utility risk.

In this section, the electrical corporation must:

- Describe how it selects areas of its service territory at risk from wildfire for potential mitigation initiatives, including, at a minimum, the following:
    - Geographic scale used in prioritization (i.e., regional, circuit, circuit segment, span, asset)

- Statistical approach used to select prioritized areas (e.g., areas in top 20 percent for risk, areas in top 20 percent for consequences)
- Feasibility constraints (e.g., limitations on data resolution, jurisdictional considerations, accessibility)

- Present a list that identifies, describes, and prioritizes areas of its service territory at risk from wildfire for potential mitigation initiatives based solely on overall utility risk, including the associated risk drivers.

Table 7-2. Example of List of Prioritized Areas in an Electrical Corporations Service Territory Based on Overall Utility Risk

Priority	Area	Description	Overall Utility Risk	Associated Risk Drivers
1				
2				

7.1.4 Mitigation Selection Process

After the electrical corporation creates a list of top-risk contributing circuits/segments/spans (Section 6.4.2) and prioritized areas based on overall utility risk (Section 7.1.3), the electrical corporation must then identify potential mitigation strategies. It must also evaluate the benefits and drawbacks of each strategy at different scales of application (e.g., circuit, circuit segment, system-wide). In this section of the WMP, the electrical corporation must provide the basis for its decisions regarding which mitigation initiatives to pursue. It must also document how it develops, evaluates, and selects mitigation initiatives.

The electrical corporation should consider appropriate mitigation initiatives depending on the local conditions and setting and the risk components that create the high-risk conditions. There may be a wide variety of potential mitigation initiatives, such as:

- Engineering changes to grid design
- Discretionary inspection and/or maintenance of existing assets
- Vegetation clearances beyond minimum regulatory requirements
- Alternative operational policies, practices, and procedures
- Improved emergency planning and coordination

The electrical corporation may also mitigate risk by combining multiple mitigation initiatives.

The electrical corporation is expected to use its procedures discussed in Section 7 to:

- Develop potential mitigation initiative approaches to address each risk
- Characterize the potential mitigation initiatives to provide decision makers with information required to support decision making (e.g., costs, material availability), including an assessment of uncertainties
- Document the results

The electrical corporation must develop a proposed schedule for implementing each mitigation initiative and proposed metrics to monitor implementation and effectiveness of the mitigation initiative. The following subsections provide specific requirements.[18]

7.1.4.1 Identifying and Evaluating Mitigation Initiatives

The electrical corporation must describe how it identifies and evaluates options for mitigating wildfire and PSPS risk at various analytical scales. The current guidelines governing this process are derived from the Risk-Based Decision-Making Framework established in the Safety Model and Assessment Proceeding (S-MAP).[19] The S-MAP is currently being updated in CPUC proceeding R. 20-07-013.[20] In due course, the electrical corporation's risk mitigation identification procedure must align with results from this proceeding.[21] The electrical corporation must describe the following:

- The procedures for identifying and evaluating mitigation initiatives (comparable to 2018 S-MAP Settlement Agreement, row 26), including the use of risk buy-down estimates (e.g., risk-spend efficiency) and evaluating the benefits and drawbacks of mitigations

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[18] Annual information included in this section must align with Tables 11 and 12 of the QDR.

[19] 2018 Safety Model Assessment Proceeding (2018 S-MAP), adopted in D.18-12-014 (see S-MAP, step 3, rows 15–25): https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M250/K281/250281848.pdf

[20] See the Rulemaking 20-07-013 (Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities) Proceeding Docket (accessed Oct. 27, 2022): https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5_PROCEEDING_SELECT:R2007013.
Also see the Risk Assessment Mitigation Phase (RAMP) proceeding (accessed Oct. 27, 2022): https://www.cpuc.ca.gov/about-cpuc/divisions/safety-policy-division/risk-assessment-and-safety-analytics/risk-assessment-mitigation-phase.

[21] Electrical corporations are not required to incorporate changes made as a result of proceeding R. 20-07-013 in the 2023-2025 WMPs submitted in 2023.

- To the extent possible, multiple potential locally relevant mitigation initiatives to address local wildfire risk drivers (see 2018 S-MAP Settlement Agreement, row 29)
- The approach the electrical corporation uses to characterize uncertainties and how the electrical corporation's evaluation and decision-making process incorporates these uncertainties (see 2018 S-MAP Settlement Agreement, rows 29 and 30)
- Two or more potential mitigation initiatives for each risk driver included in the list of prioritized areas (Table 7-2 in Section 7.1.3), including the following information:
    - The initiatives and activities
    - Expected risk reduction and impact on individual risk components
    - Estimated implementation costs
    - Relevant uncertainties
    - Implementation schedule
- How the electrical corporation uses multi-attribute value functions (MAVFs) and/or other specific risk factors (as identified in 2018 S-MAP or subsequent relevant CPUC Decisions) in evaluating different mitigations

7.1.4.2 Mitigation Initiative Prioritization

After identifying and characterizing the mitigation options, the electrical corporation must analyze the options to determine which will reduce risk the most, given limitations and constraints (e.g., resources available for mitigation initiatives). To the greatest extent practicable, the electrical corporation must make these determinations using its existing framework of project prioritization. The electrical corporation must strive to optimize its resources for maximum risk reduction.

The electrical corporation should seek the best integrated portfolio of mitigation initiatives to meet its performance objectives. Objectives may be based on quantified risk assessment results (see Section 6) or other values prioritized by the electrical corporation or broader stakeholder groups (e.g., environmental protection, public perception, resilience, cost). At a minimum, the electrical corporation must do the following:

- Evaluate its potential mitigation initiatives. This evaluation will yield a prioritized list of initiatives. The objective is for the electrical corporation to identify the preferable initiatives for specific geographical areas. (Comparable to 2018 S-MAP Settlement Agreement, rows 12, 26, and 29.)

- Identify the best mitigation initiatives for all geographical areas to create a portfolio of projects expected to provide maximal benefits within known limitations and constraints. (Comparable to 2018 S-MAP Settlement Agreement, rows 12, 26, and 29.)
- Explain how the electrical corporation is optimizing its resources to maximize risk reduction. Describe how the proposed initiatives are an efficient use of electrical corporation resources and focus on achieving the greatest risk reduction with the most efficient use of funds and workforce resources.

This process is expected to be iterative due to the competing nature of performance objectives and their complex interrelationships.

The electrical corporation must describe how it prioritizes mitigation initiatives to reduce both wildfire and PSPS risk. This discussion must include the following:

- A high-level schematic showing the procedures and evaluation criteria used to evaluate potential mitigation initiatives. At a minimum, the schematic must demonstrate the roles of quantitative risk assessment, resource allocation, evaluation of other performance objectives (e.g., cost, timing) identified by the electrical corporation, and subject matter expert (SME) judgment. Where specific local factors, which vary across the service territory, are considered in the decision-making process (e.g., the primary risk driver in a region is legacy equipment), they must be indicated in the schematic. The detail must be sufficiently specific to understand why those local conditions are part of the decision process (i.e., there should not be simply one box in the schematic that is labeled “local conditions,” which is then connected to the rest of the process).
- Summary description (no more than five pages) of the procedures and evaluation criteria for prioritizing mitigation initiatives, including the three minimum requirements listed above in this section.

7.1.4.3 Mitigation Initiative Scheduling

The electrical corporation must report on its schedule for implementing its portfolio of mitigation initiatives. The electrical corporation must describe its preliminary schedules for each initiative and its iterative processes for modifying mitigation initiatives (Section 7.1.4.1).

Mitigation initiatives may require several years to implement. For example, relocating transmission or distribution capabilities from overhead to underground may require substantial time and resources. Since mitigation initiatives are undertaken in high-risk regions, the electrical corporation may need interim mitigation initiatives to mitigate risk

while working to implement long-term strategies. Some examples of interim mitigation initiatives include more frequent inspections, fire detection and monitoring activities, and PSPS usage. If the electrical corporation's mitigation initiative requires substantial time to implement, the electrical corporation must identify and deploy interim mitigation initiatives as described in Section 7.2.3.

In its WMP submission, the electrical corporation must provide a summary description of the procedures it uses in developing and deploying mitigation initiatives. This discussion must include the following:

- How the electrical corporation schedules mitigation initiatives.
- How the electrical corporation evaluates whether an interim mitigation initiative is needed and, if so, how an interim mitigation initiative is selected (see Section 7.2.3).
- How the electrical corporation monitors its progress toward its targets within known limitations and constraints. This should include descriptions of mechanisms for detecting when an initiative is off track and for bringing it back on track.
- How the electrical corporation measures the effectiveness of mitigation initiatives (e.g., tracking the number of protective equipment and device settings de-energizations that had the potential to ignite a wildfire due to observed damage/contact prior to re-energization). The mitigation sections of these Guidelines (Sections 8) include specific requirements for each mitigation initiative.

7.2 Wildfire Mitigation Strategy

Each electrical corporation must provide an overview of its proposed wildfire mitigation strategies based on the evaluation process identified in Section 7.1.

7.2.1 Overview of Mitigation Initiatives and Activities

The electrical corporation must provide a high-level summary of the portfolio of mitigation initiatives across its service territory. In addition, the electrical corporation must describe its reasoning for the proposed portfolio of mitigation initiatives and why it did not select other potential mitigation initiatives.

Additionally, for each mitigation initiative category, the electrical corporation must provide the following:

- A high-level overview of the selected mitigation initiatives

- An implementation plan, including its schedule and how progress will be monitored
- How the need for any interim mitigation initiatives was determined and how interim mitigation initiatives were selected (see Section 7.2.3)

Table 7-3 provides an example of a summary list of mitigation initiative.

Table 7-3. Example of a List and Description of Electrical Corporation-Specific WMP Mitigation Initiatives for 3-year and 10-year Outlooks

WMP Category	Within 3 Years	Within 10 Years	Location in WMP
Grid design, operations, and maintenance	• Continue overhead fire-hardening infrastructure programs • Increase scope of strategic undergrounding • Install advanced protection capabilities • Continue to use special work procedures during high-risk conditions • Refresh, replace, and update software for all mobile devices	• Increase granularity in prioritizing initiatives across the grid • Incorporate strategic grid design and localization that includes microgrid solutions and location of lines away from highest-risk areas • Increase redundancy for grid topology and increase sectionalizing capabilities • Enhance protocols for grid operations and better understanding of associated wildfire risk • Enhance training, tools, and policies to prevent and suppress ignitions related to grid activities	Section 8.1
Vegetation management	• Continue development of the inventory tree database • Continue to implement the vegetation management work plan with enhanced clearances in high-risk areas (going beyond regulatory requirements) • Continue fuels management program	• Increase granularity in vegetation database • Enhance modeling capabilities to better predict vegetation growth patterns and probability of failure • Optimize vegetation inspection cycles based on risk mitigation efficacy • Develop more robust procedures, training, and technologies for monitoring and validating work performed	Section 8.2
Situational awareness and forecasting	• Integrate weather data into National Meteorological Service for more automated, real-time operational decision making • Enhance fault detection via wireless fault indicators • Modernize and expand the weather station network • Establish tuition reimbursement program for employees to prepare a workforce trained to deal with the evolving needs associated with wildland fire management and with climate change as it relates to power electrical corporations	• Increase scope of reliable weather data and improve procedures for validating readings • Create 1-km resolution of weather data across the grid • Develop new artificial intelligence models for weather forecasts • Increase use of external weather data	Section 8.3
Emergency preparedness	• Modernize and enhance workforce training in how to respond to storms • Enhance community outreach by incorporating effectiveness outreach survey feedback, expanding tribal and AFN campaigns,	• Increase granularity and customization of response plans • Enhance customer communication and ability to reach vulnerable populations during emergencies	Section 8.4

WMP Category	Within 3 Years	Within 10 Years	Location in WMP
	and enhancing partnerships with tribal governments, community-based organizations, and local school districts • Participate in and support mutual assistance programs	• Establish more formalized review of procedures, benchmarking, and stakeholder engagement	
Community outreach and engagement	• Continue community outreach and public awareness efforts with year-round wildfire safety education and communication campaign • Assess and resolve any customer support and communications gaps identified through AFN stakeholders • Enhance communication channels and use technology to increase accessibility	• Establish more formalized mechanism to share lessons learned among peers in and outside the state • Establish more successful engagement with communities • Establish broader engagement and deeper planning with emergency and non-emergency planning agencies	Section 8.5
PSPS	• Expand generator grant program to mitigate PSPS impacts • Install PSPS sectionalizing enhancements	• Eliminate use of PSPS • Enhance prediction, communication, and mitigation of PSPS consequences • Leverage academic partnerships to analyze risk factors and incorporate into PSPS protocols	Section 9

7.2.2 Anticipated Risk Reduction

In this section, the electrical corporation must present an overview of the expected risk reduction of its wildfire mitigation activities.

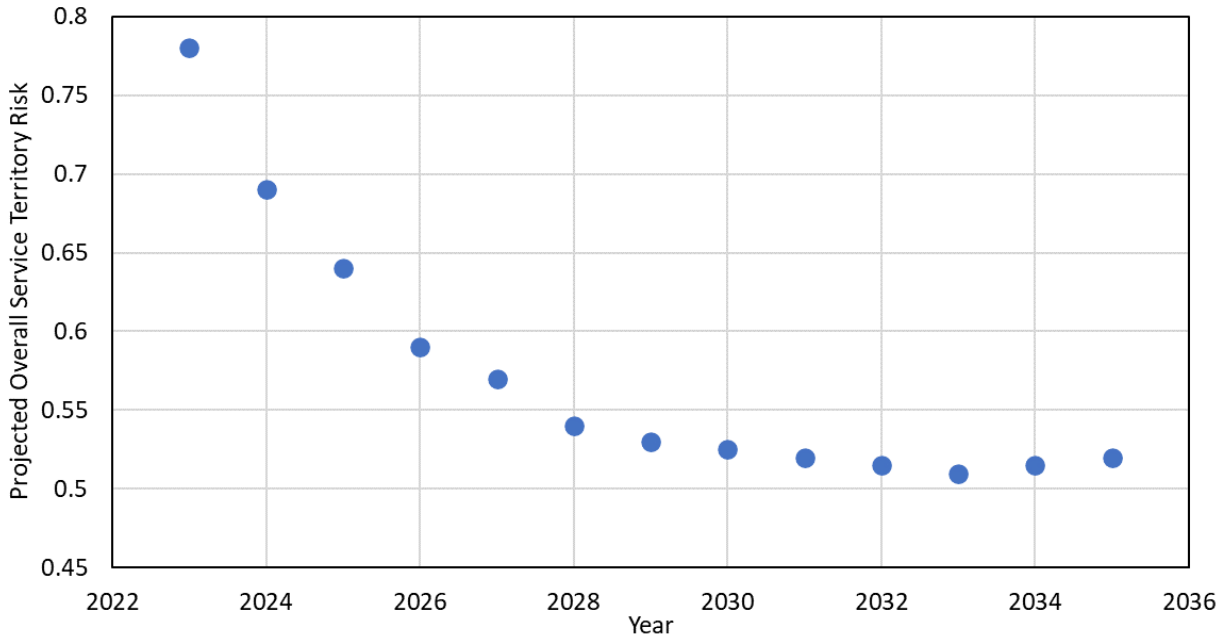
The electrical corporation must provide:

- Projected overall risk reduction
- Projected risk reduction on highest-risk circuits over the three-year WMP cycle

7.2.2.1 Projected Overall Risk Reduction

In this section, the electrical corporation must provide a figure showing the overall utility risk in its service territory as a function of time, assuming the electrical corporation meets the planned timeline for implementing the mitigations. The figure is expected to cover at least 10 years. If the electrical corporation proposes risk reduction strategies for a duration longer than ten years, this figure must show that corresponding time frame. Figure 7-1**Error! Reference source not found.** is an example of a graph showing the long-term projected changes in overall risk.

Figure 7-1. Example of Projected Overall Service Territory Risk



7.2.2.2 Risk Impact of Mitigation Initiatives

The electrical corporation must calculate the expected "x% risk impact" of each of its mitigation initiative activity targets for each year from 2023–2025. The expected x% risk impact is the expected percentage risk reduction on the last day of each year compared to the first day of that same year. For example:

For protective devices and sensitivity settings, the risk on Jan. 1, 2024 = 2.59×10^{-1}

After meeting its planned initiative activity targets for protective devices and sensitivity settings, the risk on Jan. 1, 2024 = 1.29×10^{-1}

The expected x% risk impact for the protective devices and sensitivity settings initiative in 2024 is:

$$\frac{\text{risk before} - \text{risk after}}{\text{risk before}} \times 100$$

$$\frac{2.59 \times 10^{-1} - 1.29 \times 10^{-1}}{2.59 \times 10^{-1}} \times 100 = 50\%$$

The expected "x% risk impact" numbers must be reported for each planned mitigation initiative activities in the specific mitigation initiative sections of Section 8 (see example tables in Section 8).

7.2.2.3 Projected Risk Reduction on Highest-Risk Circuits Over the Three-Year WMP Cycle

The objective of the service territory risk reduction summary is to provide an integrated view of wildfire risk reduction across the electrical corporation's service territory. The electrical corporation must provide the following information:

- Tabular summary of numeric risk reduction for each high-risk circuit, showing risk levels before and after the implementation of mitigation initiatives. This must include the same circuits, segments, or span IDs presented in Section 6.4.2. The table must include the following information for each circuit:
    - **Circuit, Segment, or Span ID:** Unique identifier for the circuit, segment, or span.
        - If there are multiple initiatives per ID, each must be listed separately, using an extender to provide a unique identifier
    - **Overall Utility Risk:** Numerical value for the overall utility risk before and after each mitigation initiative.

- **Mitigation initiatives by implementation year:** Mitigation initiatives the electrical corporation plans to apply to the circuit in each year of the WMP cycle.

Table 7-4 provides an example of a summary of risk reduction for top-risk circuits.

Table 7-4. Example of Summary of Risk Reduction for Top-Risk Circuits

Circuit, Segment, or Span ID	Jan. 1, 2023 Overall utility risk	Jan. 1, 2023 – Dec. 31, 2023 Mitigation Initiatives	Jan. 1, 2024 Overall utility risk	Jan. 1, 2024 – Dec. 31, 2024 Mitigation Initiatives	Jan. 1, 2025 Overall utility risk	Jan. 1, 2025 – Dec. 31, 2025 Mitigation Initiatives	Jan. 1, 2026 Overall utility risk
ID001	1.1x10E-3	Undergrounding	0	-	0	-	0
ID002	9.5x10E-2	Undergrounding	0	-	0	-	0
ID003	9.2x10E-2	Protective devices and sensitivity settings	4.6x10E-2	-	4.7x10E-2	Undergrounding	0
ID004	8.7x10E-2	Protective devices and sensitivity settings	4.3x10E-2	-	4.7x10E-2	Undergrounding	0
ID005	8.0x10E-2	Protective devices and sensitivity settings	4.0x10E-2	Covered conductor installation	2.0x10E-2	-	2.0x10E-2
ID006	7.5x10E-2	Vegetation management	3.5x10E-2	-	3.5x10E-2	-	3.5x10E-2

7.2.3 Interim Mitigation Initiatives

As indicated in Section 7.1.4.3, for each mitigation that will require greater than one year to implement, the electrical corporation must assess the potential need for interim mitigation initiatives to reduce risk until the primary or permanent mitigation initiative is in place. If the electrical corporation determines that an interim mitigation initiative is necessary, it must also develop and implement that initiative as appropriate.

The electrical corporation must provide a description of the following in this section of the WMP:

- The electrical corporation's procedures for evaluating the need for interim risk reduction
- The electrical corporation's procedures for determining which interim mitigation initiative(s) to implement
- The electrical corporation's characterization of each interim risk management/reduction action and evaluation of its specific capabilities to reduce risks, including:
    - Potential consequences of risk event(s) addressed by the improvement/mitigation
    - Frequency of occurrence of the risk event(s) addressed by the improvement/mitigation

Each interim mitigation initiative planned by the electrical corporation for implementation on high-risk circuits must be listed as a mitigation initiative in Section 8. In addition, interim mitigation initiatives must be discussed in the relevant mitigation initiative sections of the WMP and included in the related target tables.

8. Wildfire Mitigations

8.1 Grid Design, Operations, and Maintenance

8.1.1 Overview

In this section, the electrical corporation must identify objectives for the next 3- and 10-year periods, targets, and performance metrics related to the following grid design, operations, and maintenance programmatic areas:

- Grid design and system hardening
- Asset inspections
- Equipment maintenance and repair
- Asset management and inspection enterprise system(s)
- Quality assurance / quality control
- Open work orders
- Grid operations and procedures
- Workforce planning

8.1.1.1 Objectives

Each electrical corporation must summarize the objectives for its 3-year and 10-year plans for implementing and improving its grid design, operations, and maintenance.[22] These summaries must include the following:

- Identification of which initiative(s) in the WMP the electrical corporation is implementing to achieve the stated objective, including Utility Initiative Tracking IDs
- Reference(s) to applicable codes, standards, and best practices/guidelines and an indication of whether the electrical corporation exceeds an applicable code, standard, or regulation
- Method of verifying achievement of each objective

[22] Annual information included in this section must align with Tables 1 and 12 of the QDR.

- A target completion date
- Reference(s) to the WMP section(s) or appendix, including page numbers, where the details of the objective(s) are documented and substantiated

This information must be provided in Table 8-1 for the 3-year plan and Table 8-2 for the 10-year plan. Examples of the minimum acceptable level of information are provided below.

Table 8-1. Example of Grid Design, Operations, and Maintenance Objectives (3-year plan)

Objectives for Three Years (2023–2025)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Update all asset inspection protocols to include assessment of covered conductor condition	Distribution inspections -detailed, AI-1	GO 95, Detailed Distribution Inspection Protocol (Doc # XXXXX, version N)	Revised/ new version of protocols	February 2024	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation and substantiation.

Table 8-2. Example of Grid Design, Operations, and Maintenance Objectives (10-year plan)

Objectives for Ten Years (2026–2032)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Enable early fault detection capabilities for all circuits in the HFTD	Grid operations- fault detection (GO-1)	IEEE 37.230	A listing of all circuits in the HFTD, all early fault detection devices installed on each circuit, and installation dates	Conduct a pilot that will be completed by the end of 2023 with buildout on all HFTD circuits by the end of 2028	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

8.1.1.2 Targets

Initiative targets are forward-looking quantifiable measurements of activities identified by each electrical corporation in its WMP. Electrical corporations will show progress toward completing targets in subsequent reports, including QDRs and WMP Updates.

The electrical corporation must list all targets it will use to track progress on its grid design, operations, and maintenance for the three years of the Base WMP. Energy Safety's Compliance Assurance Division and third parties must be able to track and audit each target.[23] For each initiative target, the electrical corporation must provide the following:

- Utility Initiative Tracking IDs.
- Projected targets for each of the three years of the Base WMP and relevant units.
- Quarterly, rolling targets for 2023 and 2024 (inspections only).
- The expected "x% risk impact" for each of the three years of the Base WMP. The expected x% risk impact is the expected percentage risk reduction per year, as described in Section 7.2.2.2.
- Method of verifying target completion.

The electrical corporation's targets must provide enough detail to effectively inform efforts to improve the performance of the electrical corporation's grid design, operations, and maintenance initiatives.

Table 8-3 and Table 8-4 below provide examples of the minimum acceptable level of information.

[23] Annual information included in this section must align with Table 1 of the QDR.

Table 8-3. Example of Grid Design, Operations, and Maintenance Targets by Year

Initiative Activity	Tracking ID	2023 Target & Unit	x% Risk Impact 2023	2024 Target & Unit	x% Risk Impact 2024	2025 Target & Unit	x% Risk Impact 2025	Method of Verification
Expulsion fuse replacement	GH-1	500 Fuses Replaced	20%	600 Fuses Replaced	20%	700 Fuses Replaced	20%	Completed work orders/ GIS Data Submission(s)

Table 8-4. Example of Asset Inspections Targets by Year

Initiative Activity	Tracking ID	Target End of Q2 2023 & Unit	Target End of Q3 2023 & Unit	End of Year Target 2023 & Unit	x% Risk Impact 2023	Target End of Q2 2024 & Unit	Target End of Q3 2024 & Unit	End of Year Target 2024 & Unit	x% Risk Impact 2024	Target 2025 & Unit	x% Risk Impact 2025	Method of Verification
Discretionary patrols in HFTD	AI-02	300 circuit miles	500 circuit miles	700 circuit miles	3%	300 circuit miles inspected	500 circuit miles inspected	700 circuit miles inspected	3%	700 circuit miles inspected	3%	Work management system

8.1.1.3 Performance Metrics Identified by the Electrical Corporation

Performance metrics indicate the extent to which an electrical corporation's Wildfire Mitigation Plan is driving performance outcomes. The electrical corporation must:

- List the performance metrics the electrical corporation uses to evaluate the effectiveness of its grid design, operations, and maintenance in reducing wildfire and PSPS risk[24]

For each of these performance metrics listed, the electrical corporation must:

- Report the electrical corporation's performance since 2020 (if previously collected)
- Project performance for 2023-2025
- List method of verification

The electrical corporation must ensure that each metric's name and values are the same in its WMP reporting as its QDR reporting (specifically, QDR Table 2 and QDR Table 3). Metrics listed in this section that are the same as performance metrics required by Energy Safety and reported in QDR Table 2 (Performance Metrics)[25] must match those reported in QDR Table 2. Metrics listed in this section that are not the same as any of the performance metrics identified by Energy Safety and reported in QDR Table 2 must match those reported in QDR Table 3.

The electrical corporation must:

- Summarize its self-identified performance metrics in tabular form
- Provide a brief narrative that explains trends in the metrics

Table 8-5 provides an example of the minimum acceptable level of information.

[24] There may be overlap between the performance metrics the electrical corporation uses and performance metrics required by Energy Safety. The electrical corporation must list these overlapping metrics in this section in addition to any unique performance metrics it uses.
[25] The performance metrics identified by Energy Safety are included in Energy Safety's Data Guidelines.

Table 8-5. Example of Grid Design, Operations, and Maintenance Performance Metrics Results by Year

Performance Metrics	2020	2021	2022	2023 Projected	2024 Projected	2025 Projected	Method of Verification (e.g., third-party evaluation, QDR)
Equipment-caused ignitions							
Equipment-caused outages							
Grid inspection findings							
Open work orders (tags)							

8.1.2 Grid Design and System Hardening

In this section the electrical corporation must discuss how it is designing its system to reduce ignition risk and what it is doing to strengthen its distribution, transmission, and substation infrastructure to reduce the risk of utility-related ignitions resulting in catastrophic wildfires.

The electrical corporation is required, at a minimum, to discuss grid design and system hardening for each of the following mitigation activities:

1. Covered conductor installation
2. Undergrounding of electric lines and/or equipment
3. Distribution pole replacements and reinforcements
4. Transmission pole/tower replacements and reinforcements
5. Traditional overhead hardening
6. Emerging grid hardening technology installations and pilots
7. Microgrids
8. Installation of system automation equipment
9. Line removal (in the HFTD)
10. Other grid topology improvements to minimize risk of ignitions
11. Other grid topology improvements to mitigate or reduce PSPS events
12. Other technologies and systems not listed above

In Sections 8.1.2.1 through 8.1.2.12, the electrical corporation must provide a narrative including the following information for each grid design and system hardening mitigation activity:

- **Utility Initiative Tracking ID.**
- **Overview of the activity:** A brief description of the activity including reference to related objectives and targets. Additionally, the overview must identify whether the activity is a program, project, pilot, or study.
- **Impact of the activity on wildfire risk.**
- **Impact of the activity on PSPS risk.**
- **Updates to the activity:** Changes to the initiative since the last WMP submission and a brief explanation as to why those change were made. Discuss any planned improvements or updates to the activity and the timeline for implementation.

8.1.3 Asset Inspections

In this section, the electrical corporation must provide an overview of its procedures for inspecting its assets.

The electrical corporation must first summarize details regarding its vegetation management inspections in Table 8-6. The table must include the following:

- **Type of inspection**: i.e., distribution, transmission, or substation
- **Inspection program name:** Identify various inspection programs within the electrical corporation
- **Frequency or trigger**: Identify the frequency or triggers, such as inputs from the risk model. Indicate differences in frequency or trigger by HTFD Tier, if applicable
- **Method of inspection**: Identify the methods used to perform the inspection (e.g., patrol, detailed, aerial, climbing, and LiDAR)
- **Governing standards and operating procedures**: Identify the regulatory requirements and the electrical corporation's procedures for addressing them

Table 8-6. Example of Asset Inspection Frequency, Method, and Criteria

Type	Inspection Program	Frequency or Trigger (Note 1)	Method of Inspection (Note 2)	Governing Standards & Operating Procedures
Transmission				
Distribution				
Substation				

Note 1: The electrical corporation must provide electrical corporation-specific risk-informed triggers used for asset inspections.

Note 2: The electrical corporation must provide electrical corporation-specific definitions of the different methods of inspection.

The electrical corporation must then provide a narrative overview of each vegetation inspection program identified in the above table; Sections 8.2.2.1. provides instructions for the overviews. The sections should be numbered 8.1.3.1 to Section 8.1.3.n (i.e., each vegetation inspection program is detailed in its own section).The electrical corporation must include inspection programs it is discontinuing or has discontinued since the last WMP submission; in these cases the electrical corporation must explain why the program is being discontinued or has been discontinued.

8.1.3.1 [Asset Inspection Program]

Process

In this section, the electrical corporation must provide an overview of the individual asset inspection program, including inspection criteria and the various inspection methods used for each inspection program.

Include relevant visuals and graphics depicting the workflow and decision-making process the electrical corporation uses for the inspection program (see the example in Figure 8-1).

Frequency or Trigger

In this section, the electrical corporation must identify the frequency (including how frequency may differ by HFTD Tier or other risk designation[s]) or triggers used in the inspection program, such as inputs from the risk model.

If the inspection program is schedule-based, the electrical corporation must explain how it uses risk prioritization in the scheduling of the inspection program to target high-risk areas. If the electrical corporation does not use risk prioritization in the scheduling of the inspection program, it must explain why.

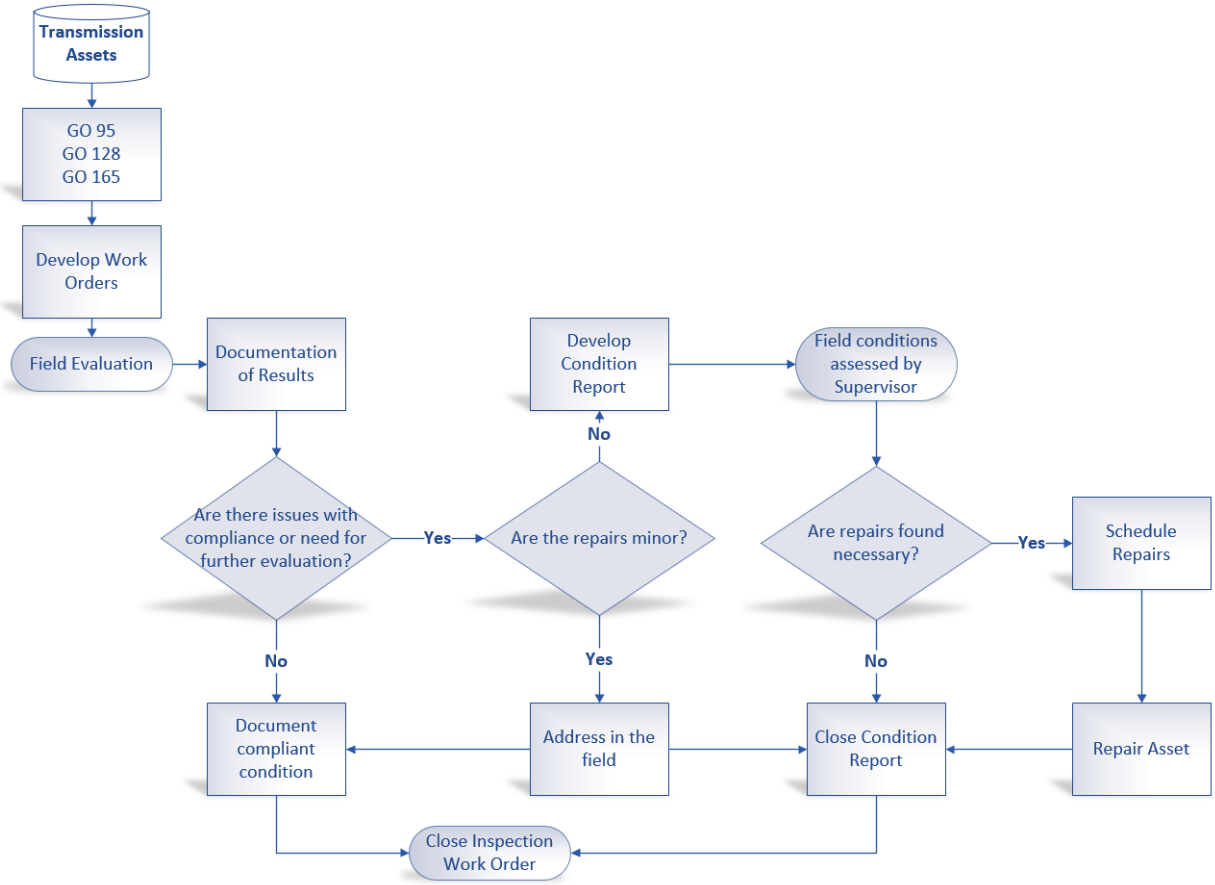
Accomplishments, Roadblocks, and Updates

In this section, the electrical corporation must discuss:

- Noteworthy accomplishments for the inspection program since the last WMP submission
- Roadblocks the electrical corporation has encountered while implementing the inspection program and how the electrical corporation has addressed the roadblocks
- Changes/updates to the inspection program since the last WMP submission including known future plans (beyond the current year) and new/novel strategies the electrical

corporation may implement in the next 5 years (e.g., references to and strategies from pilot projects and research)

Figure 8-1. Example of Asset Management and Inspections Workflow



8.1.4 Equipment Maintenance and Repair

In this section, in addition to the information described above regarding distribution, transmission, and substation inspections, the electrical corporation must provide a brief narrative of maintenance programs. As a narrative, the electrical corporation must include its strategy for maintenance, such as whether the electrical corporation replaces or upgrades facilities/equipment proactively (for example, an electrical corporation may monitor dissolved gases in its transformers to detect potential transformer failures to alert engineering and maintenance personnel or component lifecycle management) or if it runs its facilities/equipment to failure. The narrative must include, at minimum, the following types of equipment:

- Capacitors`

- Circuit breakers
- Connectors, including hotline clamps
- Conductor, including covered conductor
- Fuses, including expulsion fuses
- Distribution poles
- Lightning arrestors
- Reclosers
- Splices
- Transmission poles/towers
- Transformers
- Other equipment not listed

8.1.5 Asset Management and Inspection Enterprise System(s)

In this section, the electrical corporation must provide an overview of inputs to, operation of, and support for centralized asset management and inspection enterprise system(s) updated based upon inspection results and activities such as hardening, maintenance, and remedial work. This overview must include discussion of:

- The electrical corporation's asset inventory and condition database.
- Describe the electrical corporation's internal documentation of its database(s).
- Integration with systems in other lines of business.
- Integration with the auditing system(s) (see QA/QC section below).
- Describe internal procedures for updating the enterprise system including database(s) and any planned updates.
- Any changes to the initiative since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation.

8.1.6 Quality Assurance and Quality Control

In this section, the electrical corporation must provide an overview of its quality assurance and quality control (QA/QC) activities for asset management and inspections. This overview must include:

- Reference to procedures documenting QA/QC activities.
- How the sample sizes are determined and how the electrical corporation ensures the samples are representative.
- Qualifications of the auditors.
- Documentation of findings and how lessons learned based on those findings are incorporated into trainings and/or procedures.
- Any changes to the initiative since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation.
- Tabular information that includes:
  - Sample sizes
  - Type of QA/QC performed (e.g., desktop or field)
  - Resulting pass rates, starting in 2022
  - Yearly target pass rate for the 2023-2025 WMP cycle

Table 8-7 provides an example of the appropriate level of detail.

Table 8-7. Example of Grid Design and Maintenance QA/QC Program

Activity Being Audited	Sample Size	Type of Audit	Audit Results 2022	Yearly Target Pass Rate for 2023-2025
Patrol inspections	100% in HFTD Tier 2 and 3	Field	92%	95%

8.1.7 Open Work Orders

In this section, the electrical corporation must provide an overview of the procedures it uses to manage its open work orders resulting from inspections that prescribe asset management activities. This overview must include a brief narrative that provides:

- Reference to procedures documenting the work order process. The electrical corporation must provide a summary of these procedures or provide a copy in the supporting documents location on its website.
- A description of how work orders are prioritized based on risk.

- A description of the plan for eliminating any backlog of work orders (i.e., open work orders that have passed remediation deadlines), if applicable.
- A discussion of trends with respect to open work orders.

In addition, each electrical corporation must:

- Graph open work orders over time as reported in the QDRs (Table 2, metrics 8.a and 8.b).
- Provide an aging report for work orders past due (Table 8-8 provides an example).

Table 8-8: Example of Number of Past Due Asset Work Orders Categorized by Age

HTFD Area	0-30 Days	31-90 Days	91-180 Days	181+ Days
Non-HFTD				
HFTD Tier 2				
HFTD Tier 3				

8.1.8 Grid Operations and Procedures

8.1.8.1 Equipment Settings to Reduce Wildfire Risk

In this section, the electrical corporation must discuss the ways in which operates its system to reduce wildfire risk. The equipment settings discussion must include the following:

- Protective equipment and device settings
- Automatic recloser settings
- Settings of other emerging technologies (e.g., rapid earth fault current limiters)

For each of the above, the electrical corporation must provide a narrative on the following:

- Settings to reduce wildfire risk
- Analysis of reliability/safety impacts for settings the electrical corporation uses
- Criteria for when the electrical corporation enables the settings
- Operational procedures for when the settings are enabled

- The number of circuit miles capable of these settings
- An estimate of the effectiveness of the settings

8.1.8.2 Grid Response Procedures and Notifications

The electrical corporation must provide a narrative on operational procedures it uses to respond to faults, ignitions, or other issues detected on its grid that may result in a wildfire including, at a minimum, how the electrical corporation:

- Locates the issues
- Prioritizes the issues
- Notifies relevant personnel and suppression resources to respond to issues
- Minimizes/optimizes response times to issues

8.1.8.3 Personnel Work Procedures and Training in Conditions of Elevated Fire Risk

The electrical corporation must provide a narrative on the following:

- The electrical corporation's procedures that designate what type of work the electrical corporation allows (or does not allow) personnel to perform during operating conditions of different levels of wildfire risk, including:
    - What the electrical corporation allows (or does not allow) during each level of risk
    - How the electrical corporation defines each level of wildfire risk
    - How the electrical corporation trains its personnel on those procedures
    - How it notifies personnel when conditions change, warranting implementation of those procedures
- The electrical corporation's procedures regarding deployment of firefighting staff and equipment (e.g., fire suppression engines, hoses, water tenders, etc.) to worksites for site-specific fire prevention and ignition mitigation during on-site work

8.1.9 Workforce Planning

In this section, the electrical corporation must report on qualifications and training practices regarding wildfire and PSPS mitigation for workers in the following target roles:

- Asset inspections.

- Grid hardening.
- Risk event inspection.

For each of the target roles listed above, the electrical corporation must:

- List all worker titles relevant to the target role.
- For each worker title, list and explain minimum qualifications, with an emphasis on qualifications relevant to wildfire and PSPS mitigation. Note if the job requirements include:
    - Going beyond a basic knowledge of GO 95 requirements to perform relevant types of inspections or activities.
    - Being a “Qualified Electrical Worker” (QEW). If so, define what is required by the electrical corporation for it to consider a worker to be a QEW in terms of certifications, qualifications, experience, etc.
- Report the percentage of electrical corporation and contractor full-time employees (FTEs) in the target role, with specific job titles.
- Report plans to improve qualifications of workers relevant to wildfire and PSPS mitigation work. The electrical corporation must explain how it is developing training programs that teach electrical workers to identify hazards that could ignite wildfires.

Table 8-9, Table 8-10, and Table 8-11 are examples of the required information.

Table 8-9. Example of Workforce Planning, Asset Inspections

Worker Title	Minimum Qualifications for Target Role	Special Certification Requirements	Electrical Corporation % FTE Min Quals	Electrical Corporation % Special Certifications	Contractor % FTE Min Quals	Contractor % Special Certifications	Reference to Electrical Corporation Training/Qualification Programs
Transmission Lineman	• Journeyman Lineman having completed an accredited apprenticeship program • IBEW Journeyman Lineman status in good standing • Class A California driver's license	• QEW, Overhead and/or Underground Inspection Training	x%	x%	x%	x%	
Thermographer	• Part 107 drone license or must obtain within first year • Level I Infrared Certification or must obtain within first year	• QEW or Electrician	x%	x%	x%	x%	

Table 8-10. Example of Workforce Planning, Grid Hardening

Worker Title	**Minimum Qualifications for Target Role**	**Special Certification Requirements**	**Electrical Corporation % FTE Min Quals**	**Electrical Corporation % Special Certifications**	**Contractor % FTE Min Quals**	**Contractor % Special Certifications**	**Reference to Electrical Corporation Training/Qualification Programs**
Apprentice Lineman	• Nine months' experience as Line Assistant • Valid California driver's license • Must have held previous position for at least nine months	• None	x%	NA	x%	NA	
Electric Troubleshooter	• Complete seven-week Relief Trouble Shooter (RETS) class and pass written and practical exams	• Journeyman Lineman	x%	x%	x%	x%	RETS Training

Table 8-11. Example of Workforce Planning, Risk Event Inspection

Worker Title	Minimum Qualifications for Target Role	Special Certification Requirements	Electrical Corporation % FTE Min Quals	Electrical Corporation % Special Certifications	Contractor % FTE Min Quals	Contractor % Special Certifications	Reference to Electrical Corporation Training/Qualification Programs
Troubleshooter	• Journeyman Lineman who completed an accredited apprenticeship program • IBEW Journeyman Lineman status in good standing • Complete seven-week RETS class and pass the associated written and practical exams	• QEW	x%	x%	x%	x%	RETS Training

8.2 Vegetation Management and Inspections

8.2.1 Overview

In accordance with Public Utilities Code section 8386(c)(9), each electrical corporation's WMP must include plans for vegetation management.

In this section, the electrical corporation must identify objectives for the next 3- and 10-year periods, targets, and performance metrics related to the following vegetation management programmatic areas:

- Vegetation inspections
- Vegetation and fuels management
- Vegetation management enterprise system
- Environmental compliance and permitting
- Quality assurance / quality control
- Open work orders
- Workforce panning

8.2.1.1 Objectives

Each electrical corporation must summarize the objectives for its 3-year and 10-year plans for implementing and improving its vegetation management and inspections.[26] These summaries must include the following:

- Identification of which initiative(s) in the WMP the electrical corporation is implementing to achieve the stated objective, including Utility Initiative Tracking IDs
- Reference(s) to applicable codes, standards, and best practices/guidelines and an indication of whether the electrical corporation exceeds an applicable code, standard, or regulation
- Method of verifying achievement of each objective
- A completion date for when the electrical corporation will achieve the objective

[26] Annual information included in this section must align with the QDR data.

- Reference(s) to the WMP section(s) or appendix, including page numbers, where the details of the objective(s) are documented and substantiated

This information must be provided in Table 8-12 for the 3-year plan and Table 8-13 for the 10-year plan. Examples of the minimum acceptable level of information are provided below.

Table 8-12. Example of Vegetation Management Implementation Objectives (3-year plan)

Objectives for Three Years (2023–2025)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Complete effectiveness of enhanced clearances study	Vegetation Clearances (VM-2)	GO 95, Rule 35, Tree Trimming Guidance	WMP reporting, report from 3rd party project manager	December 2025	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

Table 8-13. Example of Vegetation Management Implementation Objectives (10-year plan)

Objectives for Ten Years (2026–2032)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Optimize vegetation inspection cycles based on risk mitigation efficacy	All VM inspections (VM-3, VM-4, VM-5)	GO 95, Rule 35, Inspection Protocols for Vegetation in HFTD (Doc # XXXXX, version N)	Revised/updated vegetation inspection protocol with revised inspection schedule to account for risk analysis	2028	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

8.2.1.2 Targets

Initiative targets are forward-looking quantifiable measurements of activities identified by each electrical corporation in its WMP. Electrical corporations will show progress toward completing targets in subsequent reports, including QDRs and WMP Updates.

The electrical corporation must list all targets it will use to track progress on its vegetation management and inspections for the three years of the Base WMP. Energy Safety's Compliance Assurance Division and third parties must be able to track and audit each target.[27] For each initiative target, the electrical corporation must provide the following:

- Utility Initiative Tracking IDs.
- Projected targets for each of the three years of the Base WMP and relevant units.
- Quarterly, rolling targets for 2023 and 2024 (inspections only).
- The expected "x% risk impact" For each of the three years of the Base WMP. The expected x% risk impact is the expected percentage risk reduction per year, as described in Section 7.2.2.2.
- Method of verifying target completion.

The electrical corporation's targets must provide enough detail to effectively inform efforts to improve the performance (i.e., reduction in ignition probability or wildfire consequence) of the electrical corporation's vegetation management and inspections initiatives.

Table 8-14 and Table 8-15 provide examples of the minimum acceptable level of information.

[27] Annual information included in this section must align with Table 1 of the QDR.

Table 8-14. Example of Vegetation Management Initiative Targets by Year

Initiative Activity	Tracking ID	2023 Target & Unit	x% Risk Impact 2023	2024 Target & Unit	x% Risk Impact 2024	2025 Target & Unit	x% Risk Impact 2025	Method of Verification
Fuels management – Pole clearing beyond PRC 4292	VM-08	300 Poles brushed in non-SRA HFTD Tier 3 areas	1%	300 Poles brushed in non-SRA HFTD Tier 3 areas	1.2%	350 Poles brushed in non-SRA HFTD Tier 3 areas	1.2%	Work verification system, completed work orders, yearly internal audit, GIS Data Submission(s)

Table 8-15. Example of Vegetation Inspections Targets by Year

Initiative Activity	Tracking ID	Target End of Q2 2023 & Unit	Target End of Q3 2023 & Unit	End of Year Target 2023 & Unit	x% Risk Impact 2023	Target End of Q2 2024 & Unit	Target End of Q3 2024 & Unit	End of Year Target 2024 & Unit	x% Risk Impact 2024	Target 2025 & Unit	x% Risk Impact 2025	Method of Verification
Hazard tree inspections	VM-04	100 circuit miles inspected	130 circuit miles inspected	200 circuit miles inspected	3%	90 circuit miles inspected	120 circuit miles inspected	180 circuit miles inspected	2.6%	400 circuit miles inspected	6%	Inspection records, billing receipts, GIS Data Submission(s)

8.2.1.3 Performance Metrics Identified by the Electrical Corporation

Performance metrics indicate the extent to which an electrical corporation's Wildfire Mitigation Plan is driving performance outcomes. The electrical corporation must:

- List the performance metrics the electrical corporation uses to evaluate the effectiveness of its vegetation management and inspections in reducing wildfire and PSPS risk[28]

For each of these performance metrics listed, the electrical corporation must:

- Report the electrical corporation's performance since 2020 (if previously collected)
- Project performance for 2023-2025
- List method of verification

The electrical corporation must ensure that each metric's name and values are the same in its WMP reporting as its QDR reporting (specifically, QDR Table 2 and QDR Table 3). Metrics listed in this section that are the same as performance metrics required by Energy Safety and reported in QDR Table 2 (Performance Metrics)[29] must match those reported in QDR Table 2. Metrics listed in this section that are not the same as any of the performance metrics identified by Energy Safety and reported in QDR Table 2 must match those reported in QDR Table 3.

The electrical corporation must:

- Summarize its self-identified performance metric(s) in tabular form
- Provide a brief narrative that explains trends in the metrics

Table 8-16 provide are examples of the minimum acceptable level of information. The electrical corporation must provide a brief narrative that explains its trends.

[28] There may be overlap between the performance metrics the electrical corporation uses and performance metrics required by Energy Safety. The electrical corporation must list these overlapping metrics in this section in addition to any unique performance metrics it uses.
[29] The performance metrics identified by Energy Safety are included in Energy Safety's Data Guidelines.

Table 8-16. Example of Vegetation Management and Inspection Performance Metrics Results by Year

Performance Metrics	2020	2021	2022	2023 Projected	2024 Projected	2025 Projected	Method of Verification (e.g., third-party evaluation, QDR)
Vegetation-caused ignitions							
Vegetation-caused outages							
Open vegetation work orders							

8.2.2 Vegetation Management Inspections

In this section, the electrical corporation must provide an overview of its procedures for vegetation management inspections.

The electrical corporation must first summarize details regarding its vegetation management inspections in Table 8-17. The table must include the following:

- **Type of inspection**: distribution, transmission, substation, etc.
- **Inspection program name:** Identify various inspection programs within the electrical corporation (e.g., routine, enhanced vegetation, high-risk species, and off-cycle)
- **Frequency or trigger**: Identify the frequency or triggers, such as inputs from the risk model. Indicate differences in frequency or trigger by HTFD Tier, if applicable
- **Method of inspection**: Identify the methods used to perform the inspection (e.g., patrol, detailed, sounding or root examination, aerial, and LiDAR)
- **Governing standards and operating procedures**: Identify the regulatory requirements and the electrical corporation's procedures for addressing them

Table 8-17. Example of Vegetation Management Inspection Frequency, Method, and Criteria

Type	Inspection Program	Frequency or Trigger (Note 1)	Method of Inspection (Note 2)	Governing Standards & Operating Procedures
Distribution				
Transmission				
Substation				

Note 1: The electrical corporation must provide electrical corporation-specific risk-informed triggers used for vegetation management.

Note 2: The electrical corporation must provide electrical corporation-specific definitions of the different methods of inspection.

The electrical corporation must then provide a narrative overview of each vegetation inspection program identified in the above table; Sections 8.2.2.1. provides instructions for the overviews. The sections should be numbered 8.2.2.1 to Section 8.2.2.n (i.e., each vegetation inspection program is detailed in its own section). The electrical corporation must include inspection programs it is discontinuing or has discontinued since the last WMP submission; in these cases, the electrical corporation must explain why the program is being discontinued or has been discontinued.

8.2.2.1 [Vegetation Management Inspection Program]

Process

In this section, the electrical corporation must provide an overview of the individual vegetation inspection program, including inspection criteria and the various inspection methods used for each inspection program.

Include relevant visuals and graphics depicting the workflow and decision-making process the electrical corporation uses for the inspection program (see the example in Figure 8-2).

Frequency or Triggers

In this section, the electrical corporation must identify the frequency or triggers used in the inspection program, such as inputs from the risk model. It must also identify how the frequency or trigger might differ by HFTD Tier or other risk designation.

If the inspection program is based on a schedule, the electrical corporation must explain how it uses risk prioritization in the scheduling of the inspection program to target high-risk areas. If the electrical corporation does not use risk prioritization in the scheduling of the inspection program, it must explain why.

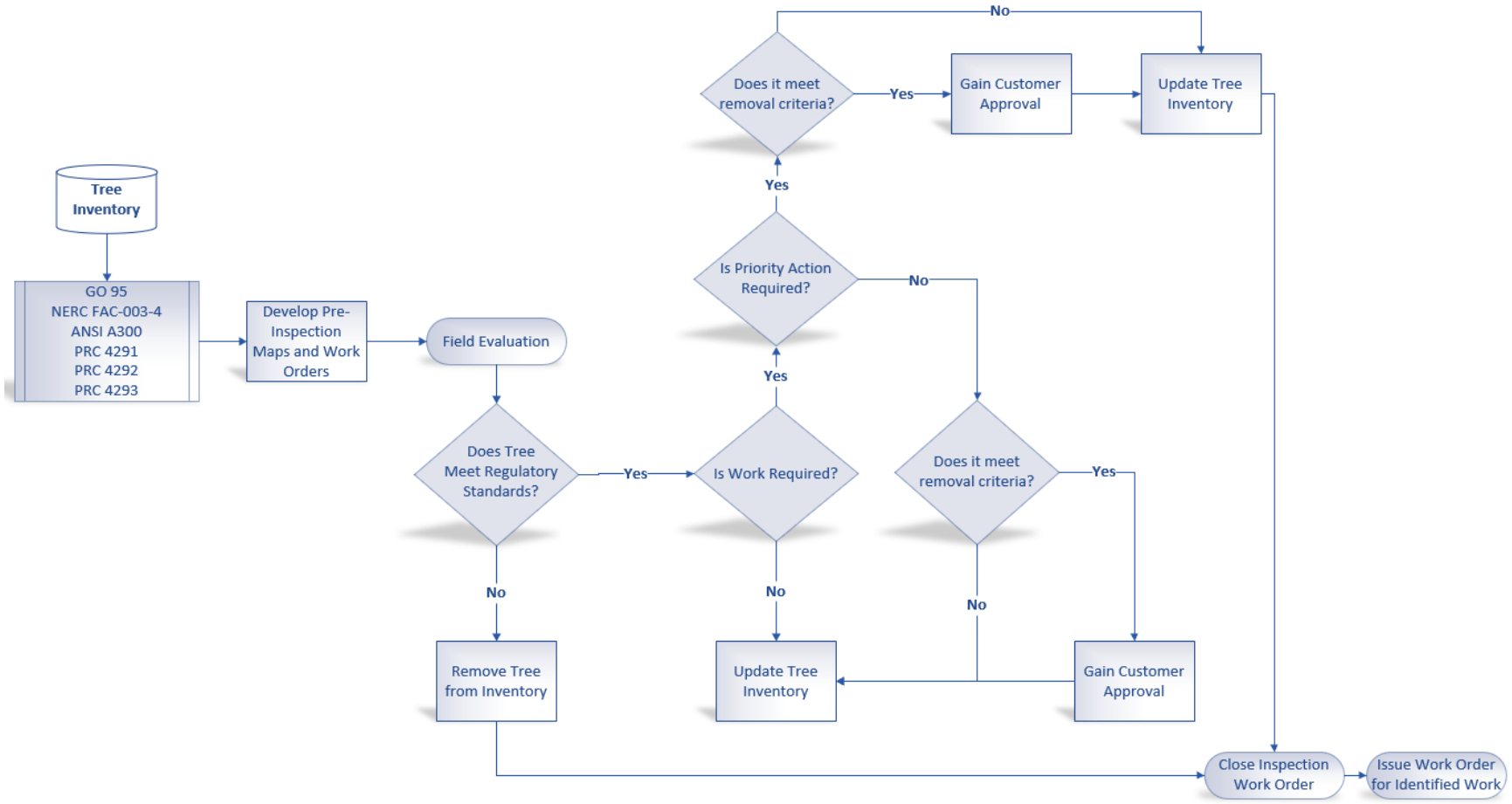
Accomplishments, Roadblocks, and Updates

In this section, the electrical corporation must discuss:

- Noteworthy accomplishments for the inspection program since the last WMP submission
- Roadblocks the electrical corporation has encountered while implementing the inspection program and how the electrical corporation has addressed the roadblocks
- Changes/updates to the inspection program since the last WMP submission including known future plans (beyond the current year) and new/novel strategies the electrical

corporation may implement in the next 5 years (e.g., references to and strategies from pilot projects and research)

Figure 8-2. Example of Vegetation Management Inspection Overview



8.2.3 Vegetation and Fuels Management

In this section, the electrical corporation must discuss the following mitigation initiatives associated with vegetation and fuels management:

1. Fuels management
2. Clearance
3. Fall-in mitigation
4. Substation defensible space
5. High-risk species
6. Fire-resilient right-of-way
7. Emergency response vegetation management

In the following subsections, the electrical corporation must provide an overview of its vegetation and fuels management initiatives. These overviews should include figure(s) that depict the workflow and decision process used for vegetation and fuels management. Figure 8-3 provides an example of the appropriate level of detail for tree trimming and removal.

In addition to figure(s), the electrical corporation must provide a narrative overview of each vegetation and fuels management initiative. The discussion must include the following:

- **Utility Initiative Tracking ID.**
- **Overview of the initiative:** A brief description of the initiative including reference to related objectives and targets .
- **Governing standards and electrical corporation standard operating procedures:** Reference to the appropriate code and electrical corporation procedure. If any standard exceeds regulatory requirements, the electrical corporation must reference the document that the electrical corporation uses as a basis for exceeding the regulatory requirements.
- **Updates to the initiative:** Changes to the initiative since the last WMP submission and a brief explanation as to why those change were made. Discuss any planned improvements or updates to the initiative and the timeline for implementation.

8.2.3.1 Pole Clearing

In this subsection, the electrical corporation must provide an overview of pole clearing activities, including:

- Pole clearing per Public Resources Code section 4292

- Pole clearing outside the requirements of Public Resources Code section 4292 (e.g., pole clearing performed outside of the State Responsibility Area)

8.2.3.2 Wood and Slash Management

In this subsection, the electrical corporation must provide an overview of how it manages all downed wood and "slash" generated from vegetation management activities, including references to applicable regulations, codes, and standards.

8.2.3.3 Clearance

In this subsection, the electrical corporation must provide an overview of clearance activities, including:

- Clearances established in excess of the minimum clearances in Table 1 of GO 95
- The bases for the clearances established

8.2.3.4 Fall-In Mitigation

In this subsection, the electrical corporation must provide an overview of its actions taken to identify and remove or otherwise remediate trees that pose a high risk of failure or fracture that could potentially strike electrical equipment (e.g., danger trees or hazard trees).

8.2.3.5 Substation Defensible Space

In this subsection, the electrical corporation must provide an overview of its actions taken to reduce ignition probability and wildfire consequence due to contact with substation equipment.

8.2.3.6 High-Risk Species

In this subsection, the electrical corporation must provide an overview of its actions, such as trimming, removal, and replacement, taken to reduce the ignition probability and wildfire consequence attributable to high-risk species of vegetation.

8.2.3.7 Fire-Resilient Right-of-Ways

In this subsection, the electrical corporation must provide an overview of its actions taken to promote vegetation communities that are sustainable, fire-resilient, and compatible with the use of the land as an electrical corporation right-of-way. It must also provide an overview of its actions to control vegetation that is incompatible with electrical equipment and with the use of the land as an electrical corporation right-of-way. This may include, but is not limited to, the following activities: the strategic use of herbicides, growth regulators, or other

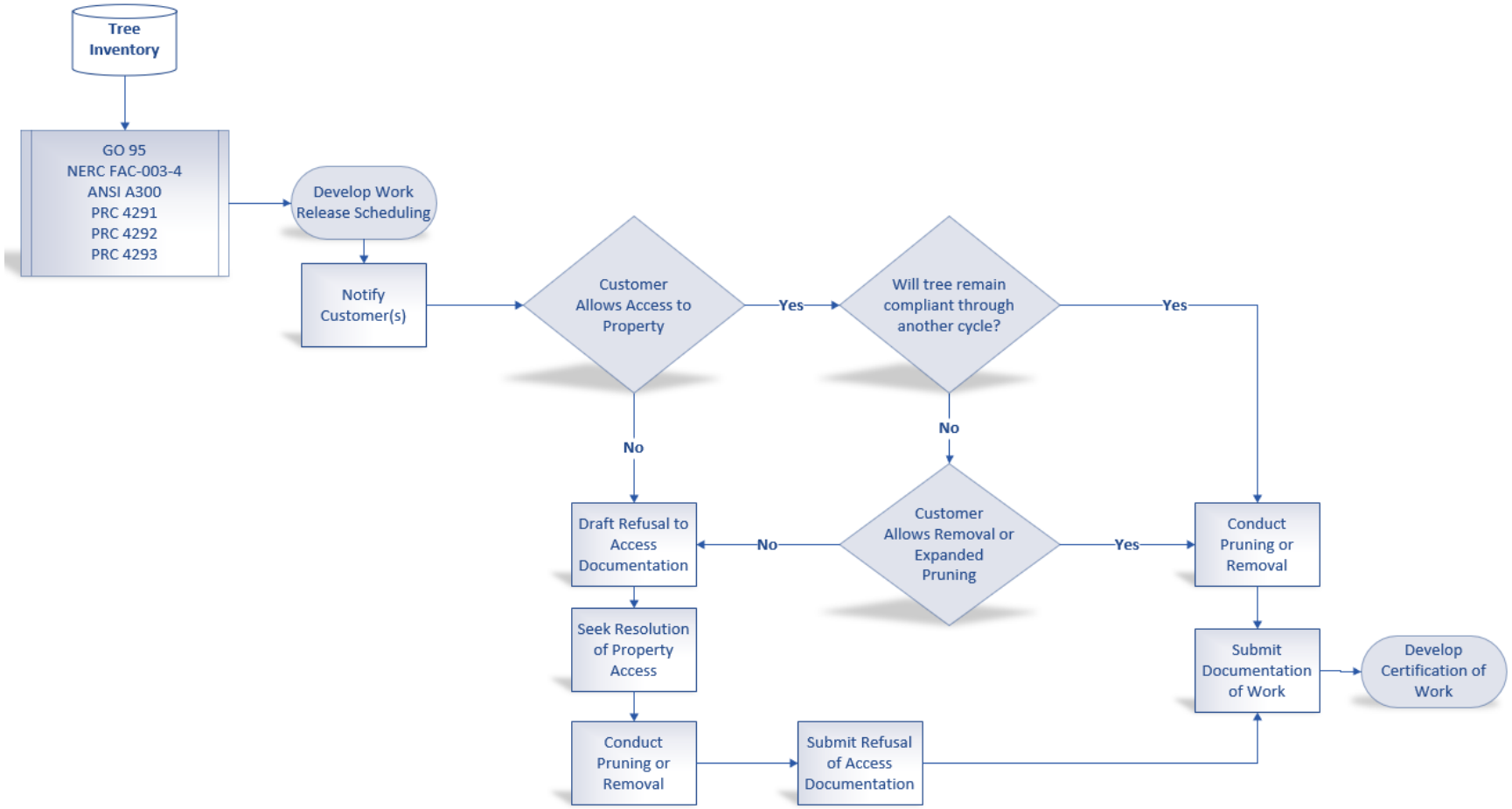
chemical controls; tree-replacement programs; promotion of native shrubs; prescribed fire; or fuel treatment activities not covered by another initiative.

8.2.3.8 Emergency Response Vegetation Management

In this subsection, the electrical corporation must provide an overview of the following emergency response vegetation management activities:

- Activities based on weather conditions:
    - Planning and execution of vegetation management activities, such as trimming or removal, executed based on and in advance of a Red Flag Warning or other weather condition forecast that indicates an elevated fire threat in terms of ignition probability and wildfire potential.
- Post-fire service restoration:
    - Vegetation management activities during post-fire service restoration, including, but not limited to, activities or protocols that differentiate post-fire vegetation management from programs described in other WMP initiatives; supporting documentation for the tool and/or standard the electrical corporation uses to assess the risk presented by vegetation after a fire; and how the electrical corporation includes fire-specific damage attributes in its assessment tool/standard. The description of such activities must differentiate between those emergency actions initiated to restore power while active fire suppression is ongoing and actions that occur following active fire suppression during the post-fire suppression repair and rehabilitation phases of fire protection operations.

Figure 8-3. Example of Tree Trimming and Removal Workflow



8.2.4 Vegetation Management Enterprise System

In this section, the electrical corporation must provide an overview of inputs to, operation of, and support for a centralized vegetation management enterprise system updated based upon inspection results and management activities such as trimming and removal of vegetation. This overview must include discussion of:

- The electrical corporation's vegetation inventory and condition database(s).
- Describe the electrical corporation's internal documentation of its database(s).
- Integration with systems in other lines of business.
- Integration with the auditing system(s) (see Section 8.2.5, "Quality Assurance and Quality Control").
- Describe internal procedures for updating the enterprise system including database(s) and any planned updates.
- Any changes to the initiative since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation.

8.2.5 Quality Assurance and Quality Control

In this section, the electrical corporation must provide an outline of its quality assurance and quality control (QA/QC) activities for vegetation management. This overview must include:

- Reference to procedures documenting QA/QC activities.
- How the sample sizes are determined and how the electrical corporation ensures the samples are representative.
- Who performs QA/QC (internal or external, is there a dedicated team, etc.).
- Qualifications of the auditors.
- Documentation of findings and how the lessons learned from those findings are incorporated into trainings and/or procedures.
- Any changes to the procedures since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation.
- Tabular information:
    - Sample sizes

- Type of QA/QC performed (e.g., desktop or field)
- Resulting pass rates, starting in 2022
- Yearly target pass rate for the 2023-2025 Base WMP cycle

Table 8-18 provides an example of the appropriate level of detail.

Table 8-18. Example of Vegetation Management QA/QC Program

Activity Being Audited	Sample Size	Type of Audit	Audit Results 2022	Yearly Target Pass Rate for 2023-2025
Hazard Tree Patrol Inspections	100% in HFTD Tiers 2 and 3	Field	92%	95%

8.2.6 Open Work Orders

In this section, the electrical corporation must provide an overview of the procedures it uses to manage its open work orders resulting from vegetation management inspections that prescribe vegetation management activities. This overview must include a brief narrative that provides:

- Reference to procedures documenting the work order process.
- A description of how work orders are prioritized based on risk.
- A description of the plan for eliminating work order backlogs (i.e., open work orders that have passed remediation deadlines), if applicable.
- A discussion of trends with respect to open work orders.

In addition, each electrical corporation must:

- Graph open work orders over time as reported in the QDRs (Table 2, metrics 7.a and 7.b).
- Provide an aging report for work orders past due (Table 8-19 provides an example).

Table 8-19: Example of Number of Past Due Vegetation Management Work Orders Categorized by Age

HTFD Area	0-30 Days	31-90 Days	91-180 Days	181+ Days
Non-HFTD				
HFTD Tier 2				
HFTD Tier 3				

8.2.7 Workforce Planning

In this section, the electrical corporation must provide a brief overview of its recruiting practices for vegetation management personnel. It must also provide its worker qualifications and training practices for workers in the following target roles:

- Vegetation inspections
- Vegetation management projects

For each of the target roles listed above, the electrical corporation must:

- List all worker titles relevant to the target role.
- List and explain minimum qualifications for each worker title with an emphasis on qualifications relevant to vegetation management. Note if the job requirements include the following:
    - Special certification requirements, such as being an International Society of Arboriculture Certified Arborist with specialty certification as a Utility Specialist or a California-licensed Registered Professional Forester
    - Additional training on biological resources identification and protection (e.g., plant and animal species and habitats); and cultural prehistoric and historic resources identification and protection
- Report the percentage of electrical corporation and contractor full-time equivalents (FTEs) in target roles with specific job titles

- Report plans to improve qualifications of workers relevant to vegetation management. The electrical corporation must explain how it is developing more robust outreach and onboarding training programs for new electric workers to identify hazards that could ignite wildfires

Table 8-20 provides an example of the required information.

Table 8-20. Example of Vegetation Management Qualifications and Training

Worker Title	**Minimum Qualifications for Target Role**	**Special Certification Requirements**	**Electrical Corporation % FTE Min Quals**	**Electrical Corporation % Special Certifications**	**Contractor % FTE Min Quals**	**Contractor % Special Certifications**	**Reference to Electrical Corporation Training/Qualification Programs**
Pre-inspector	One year of arboriculture experience or degree in relevant field	Certified Arborist, as soon as eligible	x%	x%	x%	x%	

8.3 Situational Awareness and Forecasting

8.3.1 Overview

In this section, the electrical corporation must identify objectives for the next 3- and 10-year periods, targets, and performance metrics related to the following situational awareness and forecasting programmatic areas:

- Environmental monitoring systems
- Grid monitoring systems
- Ignition detection systems
- Weather forecasting
- Ignition likelihood calculation
- Ignition consequence calculation

8.3.1.1 Objectives

Each electrical corporation must summarize the objectives for its 3-year and 10-year plans for implementing and improving its situational awareness and forecasting.[30] These summaries must include the following:

- Identification of which initiative(s) in the WMP the electrical corporation is implementing to achieve the stated objective, including Utility Initiative Tracking IDs
- Reference(s) to applicable codes, standards, and best practices/guidelines and an indication of whether the electrical corporation exceeds an applicable code, standard, or regulation
- Method of verifying achievement of each objective
- A completion date for when the electrical corporation will achieve the objective
- Reference(s) to the WMP section(s) or appendix, including page numbers, where the details of the objective(s) are documented and substantiated

[30] Annual information included in this section must align with the QDR data.

This information must be provided in Table 8-21 for the 3-year plan and Table 8-22 for the 10-year plan. Examples of the minimum acceptable level of information are provided in Tables below.

Table 8-21. Example of Situational Awareness Initiative Objectives (3-year plan)

Objectives for Three Years (2023–2025)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Automate ignition detection using third-party software	Ignition detection, SA-03	Wildfire Prevention Guide	Contract w/ third-party and active license for software	March 2025	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

Table 8-22. Example of Situational Awareness Initiative Objectives (10-year plan)

Objectives for Ten Years (2026–2032)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Create 1-km resolution of weather data across grid	Weather forecasting, SA-06	Weather Forecast Standard	Weather forecast outputs with 1-km resolution	December 2028	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

8.3.1.2 Targets

Initiative targets are forward-looking quantifiable measurements of activities identified by each electrical corporation in its WMP. Electrical corporations will show progress toward completing targets in subsequent reports, including QDRs and WMP Updates.

The electrical corporation must list all targets it will use to track progress on its situational awareness and forecasting for the three years of the Base WMP. Energy Safety's Compliance Assurance Division and third parties must be able to track and audit each target.[31] For each initiative target, the electrical corporation must provide the following:

- Utility Initiative Tracking IDs.
- Projected targets for each of the three years of the Base WMP and relevant units.
- The expected "x% risk impact" For each of the three years of the Base WMP. The expected x% risk impact is the expected percentage risk reduction per year, as described in Section 7.2.2.2.
- Method of verifying target completion.

The electrical corporation's targets must provide enough detail to effectively inform efforts to improve the performance (i.e., reduction in ignition probability or wildfire consequence) of the electrical corporation's situational awareness and forecasting initiatives.

Table 8-23 provides an example of the minimum acceptable level of information.

[31] Annual information included in this section must align with Table 1 of the QDR.

Table 8-23. Example of Situational Awareness Initiative Targets by Year

Initiative Activity	Tracking ID	2023 Target & Unit	x% Risk Impact 2023	2024 Target & Unit	x% Risk Impact 2024	2025 Target & Unit	x% Risk Impact 2025	Method of Verification
Install thermal cameras	SA-03	5 thermal cameras installed	0.5%	10 thermal cameras installed	1%	25 thermal cameras installed	2.5%	Completed work orders, GIS Data Submission(s)

8.3.1.3 Performance Metrics Identified by the Electrical Corporation

Performance metrics indicate the extent to which an electrical corporation's Wildfire Mitigation Plan is driving performance outcomes. Each electrical corporation must:

- List the performance metrics the electrical corporation uses to evaluate the effectiveness of its situational awareness and forecasting in reducing wildfire and PSPS risk[32]

For each of these performance metrics listed, the electrical corporation must:

- Report the electrical corporation's performance since 2020 (if previously collected)
- Projected performance for 2023-2025
- List method of verification

The electrical corporation must ensure that each metric's name and values are the same in its WMP reporting as its QDR reporting (specifically, QDR Table 2 and QDR Table 3). Metrics listed in this section that are the same as performance metrics required by Energy Safety and reported in QDR Table 2 (Performance Metrics)[33] must match those reported in QDR Table 2. Metrics listed in this section that are not the same as any of the performance metrics identified by Energy Safety and reported in QDR Table 2 must match those reported in QDR Table 3.

The electrical corporation must:

- Summarize its self-identified performance metric(s) in tabular form
- Provide a brief narrative that explains trends in the metrics

Table 8-24 provides an example of the minimum acceptable level of information.

[32] There may be overlap between the performance metrics the electrical corporation uses and performance metrics required by Energy Safety. The electrical corporation must list these overlapping metrics in this section in addition to any unique performance metrics it uses.
[33] The performance metrics identified by Energy Safety are included in Energy Safety's Data Guidelines.

Table 8-24. Example of Situational Awareness and Forecasting Performance Metrics Results by Year

Performance Metrics	2020	2021	2022	2023 Projected	2024 Projected	2025 Projected	Method of Verification (e.g., third-party evaluation, QDR)

8.3.2 Environmental Monitoring Systems

The electrical corporation must describe its systems and procedures for monitoring environmental conditions within its service territory. These observations should inform the electrical corporation's near-real-time risk assessment and weather forecast validation. The electrical corporation must document the following:

- Existing systems, technologies, and procedures
- How the need for additional systems is evaluated
- Implementation schedule for any planned additional systems
- How the efficacy of systems for reducing risk are monitored

Reference the Utility Initiative Tracking ID where appropriate.

8.3.2.1 Existing Systems, Technologies, and Procedures

The electrical corporation must report on the environmental monitoring systems and related technologies and procedures currently in use, highlighting any improvements made since the last WMP submission. At a minimum, the electrical corporation must discuss systems, technologies, and procedures related to the reporting of the following:

- Current weather conditions:
    - Air temperature
    - Relative humidity
    - Wind velocity (speed and direction)
- Fuel characteristics:
    - Seasonal trends in fuel moisture

Each system must be summarized in Table 8-25. The electrical corporation must provide the following additional information for each system in the accompanying narrative:

- Generalized location of the system / locations measured by the system (e.g., HTFD, entire service territory).
- Integration with the broader electrical corporation's system.
- How measurements from the system are verified.
- Frequency of maintenance.

- For intermittent systems (e.g., aerial imagery, line patrols), what triggers collection. This should include flow charts and equations as appropriate.
- For calculated quantities, how raw measurements are converted into calculated quantities. This should include flow charts and equations as appropriate.

Table 8-25. Example of Environmental Monitoring Systems

System	Measurement/ Observation	Frequency	Purpose and Integration
Weather stations	Steady wind velocity Gust wind velocity Air temperature Relative humidity	3,600 observations / hour	Improve weather forecasts through data assimilation Validate model
Remote sensing fuel moistures	Percentiles	Once a day	Calculate fuel moisture content

8.3.2.2 Evaluation and Selection of New Systems

The electrical corporation must describe how it evaluates the need for additional environmental monitoring systems. This description must include:

- How the electrical corporation evaluates the impact of new systems on reducing risk (e.g., expected quantitative improvement in weather forecasting)
- How the electrical corporation evaluates the efficacy of new technologies

These descriptions should include flow charts as appropriate.

8.3.2.3 Planned Improvements

The electrical corporation must describe its planned improvements for its environmental monitoring systems.[34] This must include any plans for the following:

- Expansion of existing systems
- Establishment of new systems

For each planned improvement, the electrical corporation must provide the following in Table 8-26:

- **Description:** A description of the planned initiative activity
- **Impact:** Reference to and description of the impact of the initiative activity on each risk and risk component
- **Prioritization:** A description of the x% risk impact (see Section 8.1.1.2 for explanation)
- **Schedule:** A description of the planned schedule for implementation

Table 8-26. Example of Planned Improvements to Environmental Monitoring Systems

System	Description	Impact	x% Risk Impact	Implementation Schedule

8.3.2.4 Evaluating Mitigation Initiatives

The electrical corporation must describe its procedures for the ongoing evaluation of the efficacy of its environmental monitoring program.

8.3.3 Grid Monitoring Systems

The electrical corporation must describe its systems and procedures used to monitor the operational conditions of its equipment. These observations should inform the electrical corporation's near-real-time risk assessment. The electrical corporation must document:

- Existing systems, technologies, and procedures

[34] Annual information included in this section must align with Tables 7 and 8 of the QDR.

- Procedure used to evaluate the need for additional systems
- Implementation schedule for any planned additional systems
- How the efficacy of systems for reducing risk are monitored

Reference the Utility Initiative Tracking ID where appropriate.

8.3.3.1 Existing Systems, Technologies, and Procedures

The electrical corporation must report on the grid system monitoring systems and related technologies and procedures currently in use, highlighting any improvements made since the last WMP submission. At a minimum, the electrical corporation must discuss systems, technologies, and procedures related to the detection of:

- Faults (e.g., fault anticipators, rapid earth fault current limiters, etc.)
- Failures
- Recloser operations

Each system must be summarized in Table 8-27 below. The electrical corporation must provide the following information for each system in the accompanying narrative:

- Location of the system / locations measured by the system
- Integration with the broader electrical corporation's system
- How measurements from the system are verified
- For intermittent systems (e.g., aerial imagery, line patrols), what triggers collection. This should include flow charts and equations as appropriate
- For calculated quantities, how raw measurements are converted to calculated quantities. This should include flow charts and equations as appropriate.

Table 8-27. Example of Grid Operation Monitoring Systems

System	Measurement/ Observation	Frequency	Purpose and Integration
Line sensors	• Electrical current • Electrical voltage	• 3,600 observations / hour	• Early fault detection • Distribution fault anticipator (DFA)

System	Measurement/ Observation	Frequency	Purpose and Integration
	• Waveform harmonics		

8.3.3.2 Evaluation and Selection of New Systems

The electrical corporation must describe how it evaluates the need for additional grid operation monitoring systems. This description must include:

- How the electrical corporation evaluates the impact of new systems on reducing risk (e.g., expected reduction in ignitions from failures, expected reduction in failures)
- How the electrical corporation evaluates the efficacy of new technologies

These descriptions should include flow charts as appropriate.

8.3.3.3 Planned Improvements

The electrical corporation must describe its planned improvements in its grid operation monitoring systems. This must include any plans for the following:

- Expansion of existing systems
- Establishment of new systems

For each planned improvement, the electrical corporation must provide the following in Table 8-28:

- Description: A description of the planned initiative activity
- Impact: Reference to and description of the impact of the initiative activity on each risk and risk component
- Prioritization: A description of the x% risk impact (see Section 8.1.1.2 for explanation)
- Schedule: A description of the planned schedule for implementation

Table 8-28. Example of Planning Improvements to Grid Operation Monitoring Systems

System	Description	Impact	x% Risk Impact	Implementation Schedule
Line sensors on distribution lines	Installation of DFA sensors on circuit segments in distribution lines in HFTD	Early fault detection to prevent ignition from a line which had failure resulting from contact or equipment failure	80%	Pilot program, 2023–2025 Analysis of pilot, 2025–2026 Installation of systems, 2026–2029

8.3.3.4 Evaluating Mitigation Initiatives

The electrical corporation must describe its procedures for the ongoing evaluation of the efficacy of its grid operation monitoring program.

8.3.3.5 Enterprise System for Grid Monitoring

In this section, the electrical corporation must provide an overview of its enterprise system for grid monitoring. This overview must include discussion of:

- Any database(s) used for storage
- Describe the electrical corporation's internal documentation of its database(s)
- Integration with systems in other lines of business
- Describe any QA/QC or auditing of its system
- Describe internal processes for updating the enterprise system including database(s)
- Any changes to the initiative since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation

8.3.4 Ignition Detection Systems

The electrical corporation must describe its systems, technologies, and procedures used to detect ignitions within its service territory and gauge their size and growth rates.

The electrical corporation must document the following:

- Existing ignition detection sensors and systems
- Evaluation and selection of new ignition detection systems
- Planned integration of new ignition detection technologies
- Monitoring of mitigation improvements

Reference the Utility Initiative Tracking ID where appropriate.

8.3.4.1 Existing Ignition Detection Sensors and Systems

The electrical corporation must report on the sensors and systems, technologies, and procedures for ignition detection that are currently in use, highlighting any improvements made since the last WMP submission. At a minimum, the electrical corporation must document the deployment of each of the following:

- Early fire detection including, for example:
  - Satellite infrared imagery
  - High-definition video
  - Infrared cameras
- Fire growth potential software

The electrical corporation must summarize each system in Table 8-29 below. It must provide the following additional information for each system in an accompanying narrative:

- General location of detection sensors (e.g., HFTD or entire service territory)
- Resiliency of sensor communication pathways
- Integration of sensor data into machine learning or AI software
- Role of sensor data in risk response
- False positives filtering
- Time between detection and confirmation
- Security measures for network-based sensors

Table 8-29. Example of Fire Detection Systems Currently Deployed

Detection System	Capabilities	Companion Technologies	Contribution to Fire Detection and Confirmation
Video cameras	Real-time viewing of remote area to detect smoke and wildfires	Used with satellite imagery to verify fire detection	Video cameras allow fast and accurate detection or confirmation of wildfires and can help operators assess the scope of resource response needed.

8.3.4.2 Evaluation and Selection of New Detection Systems

The electrical corporation must describe how it evaluates the need for additional ignition detection technologies. This description must include:

- How the electrical corporation evaluates the impact on new detection technologies on reducing and improving detection and response times
- How the electrical corporation evaluates the efficacy of new technologies
- The electrical corporation's budgeting process for new detection system purchases

8.3.4.3 Planned Integration of New Ignition Detection Technologies

The electrical corporation must provide an implementation schedule for new ignition detection and alarm system technologies. This must include any plans for the following:

- Integration of new systems into existing physical infrastructure
- Integration of new systems into existing data analysis
- Increases in budgets and staffing to support new systems

For each new technology system, the electrical corporation must provide the following in Table 8-30:

- **Description:** A description of the technology's capabilities
- **Impact:** A description of the impact the technology will have on each risk and risk component

- **Prioritization:** A description of the x% risk impact (see Section 8.1.1.2 for explanation)
- **Schedule:** A description of the planned schedule for implementation

Table 8-30. Example of Planning Improvements to Fire Detection and Alarm Systems

System	Description	Impact	x% Risk Impact	Implementation Schedule
High-definition cameras	Installation of high-definition cameras within the HFTD	Estimated reduction in average time to detection within HFTD from 4 hours to 1 hour	80%/10%	Installation of systems – 2024

8.3.4.4 Evaluating Mitigation Initiatives

The electrical corporation must describe its procedures for the ongoing evaluation of the efficacy of its fire detection systems.

8.3.4.5 Enterprise System for Ignition Detection

In this section, the electrical corporation must provide an overview of its enterprise system for ignition detection. This overview must include discussion of:

- Any database(s) used for storage.
- Describe the electrical corporation's internal documentation of its database(s).
- Integration with systems in other lines of business.
- Describe any QA/QC or auditing of its system.
- Describe internal processes for updating the enterprise system including database(s).
- Any changes to the initiative since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation.

8.3.5 Weather Forecasting

The electrical corporation must describe its systems and procedures used to forecast weather within its service territory. These forecasts should inform the electrical corporation's near-real-time-risk assessment and PSPS decision-making processes. The electrical corporation must document the following:

- Its existing modeling approach
- The known limitations of its existing approach
- Implementation schedule for any planned changes to the system
- How the efficacy of systems for reducing risk are monitored

Reference the Utility Initiative Tracking ID where appropriate.

8.3.5.1 Existing Modeling Approach

At a minimum, the electrical corporation must discuss the following components of weather forecasting:

- **Data assimilation** from environmental monitoring systems within the electrical corporation service territory
- **Ensemble forecasting** with control forecast and perturbations
- **Model inputs** including, for example:
  - Land cover / land use type
  - Local topography
- **Model outputs** including, for example:
  - Air temperature
  - Barometric pressure
  - Relative humidity
  - Wind velocity (speed and direction)
  - Solar radiation
  - Rainfall duration and amount
- **Separate modules** (e.g., local weather analysis and local vegetation analysis)
- **Subject matter expert (SME) assessment of forecasts**
- **Spatial granularity of forecasts** including:

  - Horizontal resolution
  - Vertical resolution
- **Time horizon** of the weather forecast throughout the service territory

The electrical corporation must highlight improvements made to the electrical corporation's weather forecasting since the last WMP submission.

The electrical corporation must also provide documentation of its modeling approach pertaining to its weather forecasting system in accordance with the requirements in Appendix B.

8.3.5.2 Known Limitations of Existing Approach

The electrical corporation must describe any known limitations of its existing modeling approach resulting from assumptions, data availability, and computational resources. It must discuss the impact of these limitations on the modeling outputs.

8.3.5.3 Planned Improvements

The electrical corporation must describe its planned improvements in its weather forecasting systems. This must include any plans for the following:

- Increase in model validation
- Increase in spatial granularity
- Decrease in limitations by removal of assumptions
- Increase in input data quality
- Increase in related frequency

For each planned improvement, the electrical corporation must provide the following in Table 8-31:

- **Description:** A description of the planned initiative activity
- **Impact:** Reference to and description of the impact of the initiative activity on each risk and risk component
- **Prioritization:** A description of the x% risk impact (see Section 8.1.1.2 for explanation)
- **Schedule:** A description of the planned schedule for implementation

Table 8-31. Example of Planned Improvements to Weather Forecasting Systems

System	Description	Impact	x% Risk Impact	Implementation Schedule
Spatial granularity	Increasing spatial granularity of weather forecasts in HFTD tiers 2 and 3 to 1 km	Improve accuracy of localized forecasts in complex terrains	80%/10%	Pilot system, 2023–2024 Integrate system throughout HFTD, 2024–2026

8.3.5.4 Evaluating Mitigation Initiatives

The electrical corporation must describe its procedures for the ongoing evaluation of the efficacy of its weather forecasting program.

8.3.5.5 Enterprise System for Weather Forecasting

In this section, the electrical corporation must provide an overview of its enterprise system for weather forecasting. This overview must include discussion of:

- Any database(s) used for storage.
- Describe the electrical corporation's internal documentation of its database(s).
- Integration with systems in other lines of business.
- Describe any QA/QC or auditing of its system.
- Describe internal processes for updating the enterprise system including database(s).
- Any changes to the initiative since the last WMP submission and a brief explanation as to why those changes were made. Include any planned improvements or updates to the initiative and the timeline for implementation.

8.3.6 Fire Potential Index

The electrical corporation must describe its process for calculating its fire potential index (FPI) or a similar a landscape scale index used as a proxy for assessing real-time risk of a wildfire under current and forecasted weather conditions. The electrical corporation must document the following:

- Its existing calculation approach and how its FPI is used in its operations

- The known limitations of its existing approach
- Implementation schedule for any planned changes to the system

Reference the Utility Initiative Tracking ID where appropriate.

8.3.6.1 Existing Calculation Approach and Use

The electrical corporation must describe:

- How it calculates its own FPI or if uses an external source, such as the United States Geological Survey[35]
- How it uses its or an FPI in its operations

Additionally, if the electrical corporation calculates its own FPI, it must provide tabular information regarding the features of its FPI. Table 8-32 provides a template for the required information.

[35] United States Geological Survey Fire Danger Map and Data Products Web Page (accessed Oct. 27, 2022): https://firedanger.cr.usgs.gov/viewer/index.html.

Table 8-32: Example of Fire Potential Features

Feature Group	Feature	Altitude	Description	Source	Update Cadence	Spatial Granularity	Temporal Granularity
Weather	Temperature	Surface	Temperature at the surface in Fahrenheit	Weather model	6x per day	1 km	Hourly
Fuel Moisture	Dead Fuel Moisture	Surface	Fuel moisture content	Weather model & third-party data set	Daily	2 km	Daily

8.3.6.2 Known Limitations of Existing Approach

The electrical corporation must describe any known limitations of current FPI calculation.

8.3.6.3 Planned Improvements

The electrical corporation must describe its planned improvements for its FPI including a description of the improvement and the planned schedule for implementation.

8.4 Emergency Preparedness

8.4.1 Overview

Each electrical corporation must develop and adopt an emergency preparedness[36] plan in compliance with the standards established by the CPUC pursuant to Public Utilities Code section 768.6(a). Wildfires and PSPS events introduce unique risk management challenges requiring the electrical corporation to evaluate, develop, and implement wildfire- and PSPS-specific emergency preparedness activities as part of a holistic emergency preparedness strategy.

In this section, the electrical corporation must identify objectives for the next 3- and 10-year periods, targets, and performance metrics related to the following emergency preparedness programmatic areas:

- Wildfire and PSPS emergency preparedness plan
- Collaboration and coordination with public safety partners
- Public notification and communication strategy
- Preparedness and planning for service restoration
- Customer support in wildfire and PSPS emergencies
- Learning after wildfire and PSPS events

[36] "Emergency and Disaster Preparedness" from Public Utilities Code section 768.6 has been shortened here to Emergency Preparedness.

8.4.1.1 Objectives

Each electrical corporation must summarize the objectives for its 3-year and 10-year plans for implementing and improving its emergency preparedness.[37] These summaries must include the following:

- Identification of which initiative(s) in the WMP the electrical corporation is implementing to achieve the stated objective, including Utility Initiative Tracking IDs
- Reference(s) to applicable codes, standards, and best practices/guidelines and an indication of whether the electrical corporation exceeds an applicable code, standard, or regulation
- Method of verifying achievement of each objective
- A completion date for when the electrical corporation will achieve the objective
- Reference(s) to the WMP section(s) or appendix, including page numbers, where the details of the objective(s) are documented and substantiated

This information must be provided in Table 8-33 for the 3-year plan and Table 8-34 for the 10-year plan. Examples of the minimum acceptable level of information are provided below.

[37] Annual information included in this section must align with the QDR data.

Table 8-33. Example of Emergency Preparedness Initiative Objectives (3-year plan)

Objectives for Three Years (2023–2025)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Update workforce training for emergency response	Emergency Preparedness Plan, EP-01	Emergency Readiness Training Portfolio; GO 166	Updated emergency response training curriculums; training records including pass rates	June 2024	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

Table 8-34. Example of Emergency Preparedness Initiative Objectives (10-year plan)

Objectives for Ten Years (2026–2032)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Increase granularity and customization of response plans	Emergency Preparedness Plan, EP-01	Emergency Preparedness Plan	Existence of emergency plans based on region of service territory	January 2030	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

8.4.1.2 Targets

Initiative targets are forward-looking quantifiable measurements of activities identified by each electrical corporation in its WMP. Electrical corporations will show progress toward completing targets in subsequent reports, including QDRs and WMP Updates.

The electrical corporation must list all targets it will use to track progress on its emergency preparedness for the three years of the Base WMP. Energy Safety's Compliance Assurance Division and third parties must be able to track and audit each target.[38] For each initiative target, the electrical corporation must provide the following:

- Utility Initiative Tracking IDs.
- Projected targets for the three years of the Base WMP and relevant units.
- The expected "x% risk impact" for each of the three years of the Base WMP. The expected x% risk impact is the expected percentage risk reduction per year, as described in Section 7.2.2.2.
- Method of verifying target completion.

The electrical corporation's targets must provide enough detail to effectively inform efforts to improve the performance (i.e., reduction in wildfire consequence) of the electrical corporation's emergency preparedness initiatives.

Table provides an example of the minimum acceptable level of information.

[38] Annual information included in this section must align with Tables 1 and 12 of the QDR.

Table 8-35. Example of Emergency Preparedness Initiative Targets by Year

Initiative Activity	Tracking ID	2023 Target & Unit	x% Risk Impact 2023	2024 Target & Unit	x% Risk Impact 2024	2025 Target & Unit	x% Risk Impact 2025	Method of Verification
Conduct emergency drills	EP-03	4 emergency drills conducted	0.5%	4 drills	0.5%	4 drills	0.5%	After drill reports

8.4.1.3 Performance Metrics Identified by the Electrical Corporation

Performance metrics indicate the extent to which an electrical corporation's Wildfire Mitigation Plan is driving performance outcomes. Each electrical corporation must:

- List the performance metrics the electrical corporation uses to evaluate the effectiveness of its emergency preparedness in reducing wildfire and PSPS risk[39]

For each of these performance metrics listed, the electrical corporation must:

- Report the electrical corporation's performance since 2020 (if previously collected)
- Project performance for 2023-2025
- List method of verification

The electrical corporation must ensure that each metric's name and values are the same in its WMP reporting as its QDR reporting (specifically, QDR Table 2 and QDR Table 3). Metrics listed in this section that are the same as performance metrics required by Energy Safety and reported in QDR Table 2 (Performance Metrics)[40] must match those reported in QDR Table 2. Metrics listed in this section that are not the same as any of the performance metrics identified by Energy Safety and reported in QDR Table 2 must match those reported in QDR Table 3.

The electrical corporation must:

- Summarize its self-identified performance metric(s) in tabular form
- Provide a brief narrative that explains trends in the metrics

Table 8-36 provides an example of the minimum acceptable level of information.

[39] There may be overlap between the performance metrics the electrical corporation uses and performance metrics required by Energy Safety. The electrical corporation must list these overlapping metrics in this section in addition to any unique performance metrics it uses.
[40] The performance metrics identified by Energy Safety are included in Energy Safety's Data Guidelines.

Table 8-36. Example of Emergency Preparedness Performance Metrics Results by Year

Performance Metrics	2020	2021	2022	2023 Projected	2024 Projected	2025 Projected	Method of Verification (e.g., third-party evaluation, QDR)

8.4.2 Emergency Preparedness Plan

In this section, the electrical corporation must provide an overview of how it has evaluated, developed, and integrated wildfire- and PSPS-specific emergency preparedness strategies, practices, policies, and procedures into its overall emergency plan based on the minimum standards described in GO 166. The electrical corporation must provide the title of its latest emergency preparedness report, the date of the report, and an indication of whether the plan complies with CPUC R. 15-06-009, D. 21-05-019, and GO 166. The overview must be no more than two paragraphs.

In addition, the electrical corporation must provide a list of any other relevant electrical corporation documents that govern its wildfire and PSPS emergency preparedness planning for response and recovery efforts. This must be a bullet point list with document title, version (if applicable), and date. For example:

- Electrical Corporation's Emergency Response Plan (ECERP), Third Edition, dated January 1, 2021

Reference the Utility Initiative Tracking ID where appropriate.

8.4.2.1 Overview of Wildfire and PSPS Emergency Preparedness

In this section of the WMP, the electrical corporation must provide an overview of its wildfire- and PSPS-specific emergency preparedness plan. At a minimum, the overview must describe the following:

- Purpose and scope of the plan.
- Overview of protocols, policies, and procedures for responding to and recovering from a wildfire or PSPS event (e.g., means and methods for assessing conditions, decision-making framework, prioritizations). This must include:
    - An operational flow diagram illustrating key components of its wildfire- and PSPS-specific emergency response procedures from the moment of activation to response, recovery, and restoration of service.
    - Separate overviews and operational flow diagrams for wildfires and PSPS events.
- Key personnel, qualifications, and training.
- Resource planning and allocation (e.g., staffing).

- Drills, simulations, and tabletop exercises.
- Coordination and collaboration with public safety partners (e.g., emergency planning, interoperable communications).
- Notification of and communication to customers during and after a wildfire or PSPS event.
- Improvements/updates made since the last WMP submission.

The overview must be no more than six pages.

In addition, the electrical corporation must provide a table with a list of current gaps and limitations in evaluating, developing, and integrating wildfire- and PSPS-specific preparedness and planning features into its overall emergency preparedness plan(s). Where gaps or limitations exist, the electrical corporation must provide a remedial action plan and the timeline for resolving the gaps or limitations. Table 8-37 provides an example of the minimum level of content and detail required.

Table 8-37. Example of Key Gaps and Limitations in Integrating Wildfire- and PSPS-Specific Strategies into Emergency Plan

Gap or Limitation Subject	Remedial Brief Description	Remedial Action Plan
Limited feedback on wildfire-specific components of emergency plan	Limited coordination with local-level public safety partners in the review and development of the wildfire-specific emergency preparedness plan	**Strategy:** Establish a community advisory panel in collaboration with local government and non-governmental organizations. • **Target timeline:** Develop a process for establishing a community advisory panel, including policies and procedures, by the end of 2023. Convene the advisory panel to review and provide feedback on the emergency preparedness plan for 50% of communities by end of 2024.

8.4.2.2 Key Personnel, Qualifications, and Training

In this section, the electrical corporation must provide an overview of the key personnel constituting its emergency planning, preparedness, response, and recovery team(s) for wildfire and PSPS events. This includes identifying key roles and responsibilities, personnel resource planning (internal and external staffing needs), personnel qualifications, and required training programs.

Personnel Qualifications

The electrical corporation must report on the various roles, responsibilities, and qualifications of electrical corporation and contract personnel tasked with wildfire emergency preparedness planning, preparedness, response, and recovery, and those tasked for PSPS-related events. This may include representatives from administration, information technology (IT), human resources, communications, electrical operations, facilities, and any other mission-critical units in the electrical corporation. As part of this section, the electrical corporation must provide a brief narrative describing its process for planning to meet its internal and external staffing needs for emergency preparedness planning, preparedness, response, and recovery related to wildfire and PSPS. The narrative must be no more than two to four pages.

Table 8-38 provides an example of the minimum level of content and detail required.

Table 8-38. Example of Emergency Preparedness Staffing and Qualifications

Role	Incident Type	Responsibilities	Qualifications	No. of Dedicated Staff Required	No. of Dedicated Staff Provided	No. of Contract Workers Required	No. of Contract Workers Provided
Program Director	Wildfires	• Lead, oversee, and coordinate emergency preparedness department • Oversee all functions related to preventing, mitigating, responding to, and recovering from emergencies due to all relevant hazards for the electrical corporation • Develop, maintain, and update the electrical corporation emergency preparedness plan with associated policies, practices, and procedures • Direct and manage emergency program managers and supervisors • Evaluate resources, equipment, and personnel available to respond to emergencies • Monitor program performance; recommend and implement modifications to systems and procedures • Develop and oversee the electrical corporation's emergency operations center; evaluate regular and emergency communication systems; make recommendations as appropriate	• Incident Command Certifications: ICS 100, 200, 300, 700, 800 • Master's in Disaster Risk Management • Minimum 15 years' experience in disaster risk management and/or emergency preparedness and planning	1	1	NA	NA

Role	Incident Type	Responsibilities	Qualifications	No. of Dedicated Staff Required	No. of Dedicated Staff Provided	No. of Contract Workers Required	No. of Contract Workers Provided
Grid Operations Manager	Wildfires, PSPS	• Maintain facilities used during emergency operations		3	3		
Public Information Officer	Wildfires, PSPS	• Plan and host press conferences to announce major news or address crises • Prepare press releases, speeches, articles, social media posts, and other materials for public consumption • Develop strategies and procedures for working effectively with the media • Maintain good working relationships with media organizations • Collaborate with executive management and marketing team to ensure a cohesive public image • Work with various teams to organize and host public events and promotions • Speak directly to the public or media to address questions and represent the organization	• Bachelor's degree in communications, public relations, journalism, or related field • Prior experience in a public relations role • Exceptional written and verbal communication skills • Strong understanding of the media, including social media • Organized and detail-oriented work ethic • Ability to travel on short notice • Great public speaking and interpersonal skills	1	1		
Utility Incident Commander	Wildfires, PSPS	• Leads emergency operations center • Serve as point of contact for all wildfire-related emergencies/disasters in conjunction with the Program Director • Command all emergency response functions at the field response level		1	1		

Role	Incident Type	Responsibilities	Qualifications	No. of Dedicated Staff Required	No. of Dedicated Staff Provided	No. of Contract Workers Required	No. of Contract Workers Provided
Public Safety Partner Liaison	Wildfires, PSPS	• Develop relations with outside organizations, including local, state, and federal fire suppression organizations, the state Office of Emergency Services, the county sheriff's department, the Red Cross, school districts, etc.; maintain close working relationships to ensure rapid and coherent response in emergency situations • Coordinate with relevant public safety partners in electrical corporation's service territory (e.g., fire, law enforcement, OES, CPUC, Energy Safety, Emergency Management Systems, public health departments, public works) to coordinate emergency preparedness, response and recovery plans, roles and responsibilities, etc. • Meet with public safety officials, private companies, and the general public to get recommendations regarding emergency response plans • Coordinate with local public safety partners to assess damage to communities • Coordinate getting assistance and supplies into impacted community		3	3		

Role	Incident Type	Responsibilities	Qualifications	No. of Dedicated Staff Required	No. of Dedicated Staff Provided	No. of Contract Workers Required	No. of Contract Workers Provided
		• Oversee and direct a variety of emergency-related community education programs, including disaster preparedness programs and AM radio classes					
Trainer Officer	Wildfires, PSPS	• Run training courses and disaster exercises for staff, volunteers, and local agencies to ensure an effective and coordinated response to an emergency					

Personnel Training

The electrical corporation must report on its internal personnel training program(s) for wildfire and PSPS emergency events. This training must include, at a minimum, training on relevant policies, practices, and procedures before, during, and after a wildfire or PSPS event. The reporting must include, at a minimum:

- The name of each training program
- A brief narrative on the purpose and scope of each program
- The type of training method
- The schedule and frequency of training programs
- The percentage of staff who have completed the most current training program
- How the electrical corporation tracks who has completed the training programs

Table 8-39 provides an example of the minimum acceptable level of information.

External Contractor Training

The electrical corporation must report on its external contractor training program(s) for wildfire and PSPS emergency events. This training must include, at a minimum, training on relevant policies, practices, and procedures before, during, and after a wildfire or PSPS event. The reporting must include, at a minimum:

- The name of each training program
- A brief narrative on the purpose and scope of each program
- The type of training method
- The schedule and frequency of training programs
- The percentage of contractors who have completed the most current training program
- How the electrical corporation tracks who has completed the training programs

Table 8-40 provides an example of the minimum acceptable level of information.

Table 8-39. Example of Electrical Corporation Personnel Training Program

Training Topic	Purpose and Scope	Training Method	Training Frequency	Position or Title of Personnel Required to Take Training	# Personnel Requiring Training	# Personnel Provided with Training	Form of Verification or Reference
Introduction to the electrical corporation's emergency preparedness plan	• The contents of emergency response plans, in particular those for wildfire- and PSPS-specific incidents • The electrical corporation's overall safety practices and those specific to wildfire and PSPS incidents • The organizational structure of how the electrical corporation responds to, manages, and recovers from incidents • The electrical corporation's and public safety partners' roles and responsibilities before, during, and after a wildfire or PSPS incident • The electrical corporation's notification and activation protocols for wildfires and PSPS incidents	Online course, workshop, or in-person training	Annually	All staff	4,100	3,800	Training materials and training logs
Threats, hazards, and protection actions							
Notification, warning, and communication procedures							
Emergency response procedures during a wildfire							

Training Topic	Purpose and Scope	Training Method	Training Frequency	Position or Title of Personnel Required to Take Training	# Personnel Requiring Training	# Personnel Provided with Training	Form of Verification or Reference
Emergency shutdown procedures							
Activating and deactivating mutual aid							
Practices, policies, and procedures for emergency response and service restoration for PSPS events							

Table 8-40. Example of Contractor Training Program

Training Topic	Purpose and Scope	Training Method	Training Frequency	Position or Title of Personnel Required to Take Training	# Contractors Requiring Training	# Contractors Completed Training	Form of Verification or Reference

Introduction to the electrical corporation's mutual aid agreement with aid partner	• Familiarize aid partners with the concepts and actions in the mutual aid operations plan prior to implementation
	• Allow responding resources the opportunity to practice their procedures and responsibilities
	• Scope items include:
	  ○ Contents of mutual aid operations plan, in particular those on wildfire- and PSPS-specific incidents
	  ○ The electrical corporation's overall safety practices and those specific to wildfire and PSPS incidents
	  ○ The organizational structure and interoperability of how the mutual aid partners and resources collaborate and coordinate
	  ○ The electrical corporation's and public safety partners' roles and responsibilities before, during, and after a wildfire or PSPS incident
	  ○ The electrical corporation's notification and activation protocols for wildfires and PSPS events
		Online course, workshop, or in-person training	Annually	All potential mutual aid resources	150	135	Training materials and training logs

8.4.2.3 Drills, Simulations, and Tabletop Exercises

Discussion-based and operational-based exercises enhance knowledge of plans, allow personnel to improve their own performance, and identify opportunities to improve capabilities to respond to real wildfire emergency events and PSPS events. Exercises also provide a method to evaluate an electrical corporation's emergency preparedness plan and identify planning and/or procedural deficiencies.

Internal Exercises

The electrical corporation must report on its program(s) for conducting internal discussion-based and operations-based exercises for both wildfire and PSPS emergency events. This must include, at a minimum:

- The types of discussion-based exercises (e.g., seminars, workshops, tabletop exercises, games) and operations-based exercises (e.g., drills, functional exercises, full-scale exercises)
- The purpose of the exercises
- The schedule and frequency of exercise programs
- The percentage of staff who have completed/participated in exercises
- How the electrical corporation tracks who has completed the exercises

Table 8-41 provides an example of the minimum acceptable level of information.

External Exercises

The electrical corporation must report on its program(s) for conducting external discussion-based and operations-based exercises for both wildfire and PSPS emergency events. This must include, at a minimum:

- The types of discussion-based exercises (e.g., seminars, workshops, tabletop exercises, games) and operations-based exercises (e.g., drills, functional exercises, full-scale exercises)
- The schedule and frequency of exercise programs
- The percentage of public safety partners who have participated in these exercises
- How the electrical corporation tracks who has completed the exercises

Table 8-42 provides an example of the minimum acceptable level of information.

Table 8-41. Example of Internal Drill, Simulation, and Tabletop Exercise Program

Category	Exercise Title and Type	Purpose	Exercise Frequency	Position or Title of Personnel Required to Participate	# Personnel Participation Required	# Personnel Participation Completed	Form of Verification or Reference
Discussion-based	PSPS event tabletop exercise	• Provide electrical corporation a way to determine its readiness to respond to a PSPS event • Identify gaps or problems with existing policies and plans • Help administration and staff understand their roles during a PSPS event. • Serve as a training tool • Serve as a tool for modifying and improving existing PSPS plans based on lessons learned during the exercise	Annually	• Program Director of Emergency Planning • Grid Operations Program Manager and supervisors • Emergency Operations Center Supervisor • Public Information Officer	10	10	Exercise scoping materials and completion logs
Operations-based	Wildfire emergency drill	• Provide electrical corporation a way to determine its readiness to respond to a wildfire • Identify gaps or problems with existing policies and plans • Help personnel understand roles during a wildfire emergency • Serve as a training tool	Annually (before September 1)	• Program Director of Emergency Planning • Grid Operations Program Manager and supervisors • Emergency Operations Center Supervisor and staff • Public Information Officer • Utility Incident Commander	20	19	Exercise scoping materials and completion logs

Table 8-42. Example of External Drill, Simulation, and Tabletop Exercise Program

Category	Exercise Title and Type	Purpose	Exercise Frequency	Position or Title of Personnel Required to Participate	# Personnel Participation Required	# Personnel Participation Completed	Form of Verification or Reference
Discussion-based	PSPS event tabletop exercise	• Provide electrical corporation and public safety partners a way to determine their readiness to respond to and recover from a PSPS event • Clarify gaps or problems with existing mutual aid agreements (MAAs) and memorandums of agreement (MOAs), policies, and plans • Help electrical corporation and public safety partners understand their roles during a PSPS event • Serve as a training tool • Help identify needs for other resources • Serve as a tool for modifying and improving existing PSPS coordination and emergency response plans based on the lessons learned during the exercise	Annually	• Program Director of Emergency Planning • Grid Operations Program Manager and supervisors • Emergency Operations Center Supervisor • Fire chief(s) or liaison • Police, sheriff, and CHP chief(s) or liaisons • County Health liaison • American Red Cross liaison • Emergency Operations Supervisor(s) for relevant city/county jurisdictions	20	18	Exercise scoping materials and completion logs
Operations-based	Wildfire emergency drill	• Provide electrical corporation a way to determine its readiness to respond to a wildfire • Identify gaps or problems with existing policies and plans • Help personnel understand roles during a wildfire emergency • Serve as a training tool	Annually (before September 1)	• Program Director of Emergency Planning • Grid Operations Program Manager and supervisors • Emergency Operations Center Supervisor • Electrical corporation fire chief and fire marshal • Fire chief(s) or liaison	20	19	Exercise scoping materials and completion logs

Category	Exercise Title and Type	Purpose	Exercise Frequency	Position or Title of Personnel Required to Participate	# Personnel Participation Required	# Personnel Participation Completed	Form of Verification or Reference
				• Police, sheriff, and CHP chiefs or liaisons • County Health liaison • American Red Cross liaison • Emergency Operations Supervisor(s) for relevant city/county jurisdictions			

8.4.2.4 Schedule for Updating and Revising Plan

The electrical corporation must provide a log of the updates to its emergency preparedness plan since 2019 and the date of its next planned update.

Updates should occur every two years, per R. 15-06-009 and D. 21-05-019. For each update, the electrical corporation must provide the following:

- Year of updated plan
- Revision type (e.g., addition, modification, elimination)
- Component modified (e.g., communications, training, drills/exercises, protocols/procedures, MOAs)
- A brief description of the lesson learned that informed the revision
- A brief description of the specific addition, modification, or elimination

Table 8-43 provides an example of the minimum acceptable level of information.

Table 8-43. Example of Wildfire-Specific Updates to the Emergency Preparedness Plan

ID #	Year of Updated Plan	Revision Type	Lesson Learned	Revision Description	Reference Section
1	2022	Addition	Statutory change due to CPUC R. 15-06-009, D. 21-05-019	Updated plan to comply with California Standardized Emergency Management Systems (SEMS) per GO 166	Sections 3–8, pp. xx–yy
2	2022	Modification	In a public survey administered after the three-day PSPS on MM/DD/YYYY, numerous customers complained of not being able to visually understand which neighborhoods were going to be impacted and when the power was planned to be out and then restored. The electrical corporation website only provided tabulated information.	An additional data layer was added to the interactive PSPS customer interface portal. At least three days in advance of a planned event, this identifies the exact date and time of the planned PSPS, the estimated time of planned power restoration, and specific neighborhoods that will be impacted.	Section X, p. 15

8.4.3 External Collaboration and Coordination

8.4.3.1 Emergency Planning

In this section, the electrical corporation must provide a high-level description of its wildfire and PSPS emergency preparedness coordination with relevant public safety partners at state, county, city, and tribal levels within its service territory. The electrical corporation must indicate if its coordination efforts follow California's SEMS or, where relevant for multi-jurisdictional electrical corporations (e.g., PacifiCorp), the Federal Emergency Management Agency (FEMA) National Incident Management Systems (NIMS), as permitted by GO 166. The description must be no more than a page.

In addition, the electrical corporation must provide the following information in tabular form, with no more than one page of information in the main body of the WMP and a full table, if needed, in an appendix:

- List of relevant state, city, county, and tribal agencies within the electrical corporation's service territory and key point(s) of contact, with associated contact information. Where necessary, contact information can be redacted for the public version of the WMP.
- For each agency, whether the agency has provided consultation and/or verbal or written comments in preparation of the most current wildfire- and PSPS-specific emergency preparedness plan. If so, the electrical corporation should provide the date, time, and location of the meeting at which the agency's feedback was received.
- For each agency, whether it has an MOA with the electrical corporation on wildfire and/or PSPS emergency preparedness, response, and recovery activities. The electrical corporation must provide a brief summary of the MOA, including the agreed role(s) and responsibilities of the external agency before, during, and after a wildfire or PSPS emergency.
- In a separate table, a list of current gaps and limitations in the electrical corporation's existing collaboration efforts with relevant state, county, city, and tribal agencies within its territory. Where gaps or limitations exist, the electrical corporation must indicate the remedial action plan and the timeline for resolving the gaps or limitations.
- For all requested information, a form of verification that can be provided upon request for compliance assurance.

The electrical corporation must reference the Utility Initiative Tracking ID where appropriate.

Table 8-44 and Table 8-45 provide examples of the minimum level of content and detail required.

Table 8-44. Example of State and Local Agency Collaboration(s)

Name of State or Local Agency	**Point of Contact and Information**	**Emergency Preparedness Plan Collaboration – Last Version of Plan Agency Collaborated**	**Emergency Preparedness Plan Collaboration – Collaborative Role**	**Memorandum of Agreement (MOA)?**	**Brief Description of MOA**
Local Municipal Fire Department	John Doe, Fire Marshal John.Doe@city.gov	2022 Version (06/2021)	Attended a virtual meeting on 02/02/2022 at 1 pm PDT Provided written comments	Yes	Wildfire incidents: • Before • During • After PSPS events: • Before • During • After

Table 8-45. Example of Key Gaps and Limitations in Collaboration Activities with State and Local Agencies

Gap or Limitation Subject	Remedial Brief Description	Remedial Action Plan
Limited feedback on wildfire and PSPS emergency plan	Less than 10% of the state and local government stakeholders have been able to provide feedback and collaborate on review, development, and/or improvement of the emergency preparedness plan.	**Strategy:** Convene a 1.5-day workshop with relevant state and local agencies to review the key elements of the electrical corporation's wildfire- and PSPS-specific emergency preparedness plan. Solicit verbal and written comments from the stakeholders. Assign a government liaison to conduct follow-up meetings to obtain and discuss any comments, proposed modifications, additions, etc. **Target timeline**: Develop workshop scoping plan by June 2023 and convene workshop by end of 2023. Aim to host workshops with 50% of government stakeholders by end of 2025.

8.4.3.2 Communication Strategy with Public Safety Partners

The electrical corporation must describe at a high level its communication strategy to inform external public safety partners and other interconnected electrical corporation partners of wildfire, PSPS, and re-energization events as required by GO 166 and Public Utilities Code section 768.6. This must include a brief description of the policies, practices, and procedures the electrical corporation adopts to establish appropriate communication protocols with public safety partners for both wildfire- and PSPS-specific incidents to ensure timely, accurate, and complete communications. The electrical corporation must refer to its emergency preparedness plan as needed to provide more detail. The narrative must be no more than two pages.

As each public safety partner will have its own unique communication protocols, procedures, and systems, the electrical corporation must coordinate with each entity individually. The electrical corporation must summarize the following information in tabulated format:

- All relevant public safety partner groups (e.g., fire, law enforcement, OES, municipal governments, Energy Safety, CPUC, other electrical corporations) at every level of administration (state, county, city, or tribe) as needed.
- The names of individual public safety entities.
- For each entity, the point of contact for emergency communications coordination, and the contact information. Information may be redacted as needed.
- Key protocols for ensuring the necessary level of voice and data communications (e.g., interoperability channels, methods for information exchange, format for each data typology, communication capabilities, data management systems, backup systems, common alerting protocols, messaging), and associated references in the emergency plan for more details.
- Frequency of prearranged communication review and updates.
- Date of last discussion-based or operations-based exercise(s) on public safety partner communication.

In a separate table, the electrical corporation must list the current gaps and limitations in its public safety partner communication strategy coordination. Where gaps or limitations exist, the electrical corporation must indicate the remedial action plan and the timeline for resolving the gaps or limitations. For all requested information, the electrical corporation

must indicate a form of verification that can be provided upon request for compliance assurance.

Table 8-46 and Table 8-47 provide examples of the minimum level of content and detail required.

Table 8-46. Example of High-Level Communication Protocols, Procedures, and Systems with Public Safety Partners

Public Safety Partner Group	Name of Entity	Point of Contact and Information	Key Protocols	Frequency of Prearranged Communication Review and Update	Communication Exercise(s): Date of Last Completed	Communication Exercise(s): Date of Planned Next
Fire	Local County Fire Department	Jane Smith, Unit Manager Jane.Smith@county.org	• Communication capabilities (e.g., staffing, resources, technologies) • Methods for information exchange • Format for each data typology • Data management strategy • Backup systems • Common alerting protocols • Messaging • Refer to Sections x, y, and z in electrical corporation's Emergency Preparedness Plan and to the MOA entitled "xxxxx," dated MM/DD/YYYY.	Annually (April)	Tabletop exercise, 04/02/2022 at 1 pm PDT	Workshop, 04/02/2023 at 2 pm PDT

Table 8-47. Example of Key Gaps and Limitations in Communication Coordination with Public Safety Partners

Gap or Limitation Subject	Remedial Brief Description	Remedial Action Plan
Limited feedback on wildfire and PSPS emergency plan	Less than 10% of the state and local government stakeholders have been able to provide feedback and collaborate on review, development, and/or improvement of the emergency preparedness plan.	**Strategy:** Convene a 1.5-day workshop with relevant state and local agencies to review the key elements of the electrical corporation's wildfire- and PSPS-specific emergency preparedness plan. Solicit verbal and written comments from the stakeholders. Assign a government liaison to conduct follow-up meetings to obtain and discuss any comments, proposed modifications, additions, etc. **Target timeline**: Develop workshop scoping plan by June 2023 and convene workshop by end of 2023. Aim to host workshops with 50% of government stakeholders by end of 2025.
Uncertainty of emergency communications being received by government agencies	More than 50% of the partner government agencies have independent and different communication systems and associated protocols. Consistency and timing of notification and receipt notification is not standardized.	**Strategy:** Create an integrated, multi-channel communication system that provides for immediate notification of an event through text, email, or broadcast with secondary communication to confirm receipt. Assess current notification systems and communications protocols at the electrical corporation's monitoring center and create priority communication matrices that support the most resilient channels for sending emergency alert messages. Create a survey to be sent to all responding stakeholders to collect information on their communications capabilities and preferences. Align the electrical corporation's capabilities with each responding stakeholder and then create operating standards for dispatchers and responders to follow. **Target timeline**: Complete assessment of current systems and protocols by end of first quarter 2023. Create survey to be sent to all responding stakeholders by end of second quarter 2023. Complete alignment and testing by end of first quarter 2024.

8.4.3.3 Mutual Aid Agreements

In this section, the electrical corporation must provide a brief overview of the Mutual Aid Agreements (MAA) it has entered into regarding wildfire emergencies and/or disasters, as well as PSPS events. The overview narrative must be no more than one page.

In addition, the electrical corporation must provide the following wildfire emergency information in tabulated format:

- List of entities with which the electrical corporation has entered into an MAA
- Scope of the MAA
- Resources available from the MAA partner

Table 8-48 provides an example of the minimum level of content and detail required.

Table 8-48. Example of High-Level Mutual Aid Agreement for Resources During a Wildfire or De-Energization Incident

Mutual Aid Partner	Scope of Mutual Aid Agreement	Available Resources from Mutual Aid Partner

8.4.4 Public Emergency Communication Strategy

The electrical corporation must describe at a high level its comprehensive communication strategy to inform essential customers and other stakeholder groups of wildfires, outages due to wildfires, and PSPS and service restoration, as required by Public Utilities Code section 768.6. This should include a discussion of the policies, practices, and procedures the electrical corporation adopts to establish appropriate communication protocols to ensure timely, accurate, and complete communications. The electrical corporation may refer to its Public Utilities Code section 768.6 emergency preparedness plan to provide more detail. The narrative must be no more than one page.

In the following sections, the electrical corporation must provide an overview of the following components of an effective and comprehensive communication strategy:

- Protocols for emergency communications
- Messaging
- Current gaps and limitations

Reference the Utility Initiative Tracking ID where appropriate.

8.4.4.1 Protocols for Emergency Communications

The electrical corporation must identify the relevant stakeholder groups in its service territory and describe the protocols, practices, and procedures used to provide notification of wildfires, outages due to wildfires and PSPS, and service restoration before, during, and after each incident type. Stakeholder groups include, but are not limited to, the general public, priority essential services, AFN populations, populations with limited English proficiency, tribes, and people in remote areas. The narrative must include a brief discussion of the decision-making process and use of best practices to ensure timely, accurate, and complete communications. The narrative must be no more than one page.

The electrical corporation must also provide, in tabular form, details of the following:

- Communication methods
- Message receipt verification mechanisms

Table 8-49 provides an example of the minimum level of content and detail required.

Table 8-49. Example of Protocols for Emergency Communication to Stakeholder Groups

Stakeholder Group	Event Type	Method(s) for Communicating	Means to Verify Message Receipt
General public	Wildfire		
General public	Wildfire-related outage		
General public	PSPS-related outage		
General public	Restoration of service		
Priority essential services	Wildfire		
Priority essential services	Wildfire-related outage		
Priority essential services	PSPS-related outage		
Priority essential services	Restoration of service		
AFN populations			
Populations with limited English proficiency			
Tribes			
People in remote areas			

8.4.4.2 Messaging

In this section, the electrical corporation must describe its procedures for developing effective messaging to reach the largest percentage of stakeholders in its service territory before, during, and after a wildfire, an outage due to wildfire, or a PSPS event.

In addition, the electrical corporation must provide an overview of the development of the following aspects of its communication messaging strategy:

- Features to maximize accessibility of the messaging (e.g., font size, color contrast analyzer)
- Alert and notification schedules
- Translation of notifications
- Messaging tone and language
- Key components and order of messaging content (e.g., hazard, location, time)

The narrative must be no more than one page.

8.4.4.3 Current Gaps and Limitations

In tabulated format, the electrical corporation must provide a list of current gaps and limitations in its public communication strategy. Where gaps or limitations exist, the electrical corporation must indicate the remedial action plan and the timeline for resolving the gaps or limitations. For all requested information, the electrical corporation should indicate a form of verification that can be provided upon request for compliance assurance. Table 8-50 provides an example of the minimum level of content and detail required.

Table 8-50. Example of Key Gaps and Limitations in Public Emergency Communication Strategy

Gap or Limitation Subject	Remedial Brief Description	Remedial Action Plan
Limited feedback on wildfire and PSPS emergency plan	Less than 10% of the state and local government stakeholders have been able to provide feedback and collaborate on review, development, and/or improvement of the emergency preparedness plan.	**Strategy:** Convene a 1.5-day workshop with relevant state and local agencies to review the key elements of the electrical corporation's wildfire- and PSPS-specific emergency preparedness plan. Solicit verbal and written comments from the stakeholders. Assign a government liaison to conduct follow-up meetings to obtain and discuss any comments, proposed modifications, additions, etc. **Target timeline**: Develop workshop scoping plan by June 2023 and convene workshop by end of 2023. Aim to host workshops with 50% of government stakeholders by end of 2025.

8.4.5 Preparedness and Planning for Service Restoration

8.4.5.1 Overview of Service Restoration Plan

In this section of the WMP, the electrical corporation must provide an overview of its plan to restore service after an outage due to a wildfire or PSPS event. At a minimum, the overview must include a brief description of the following:

- Purpose and scope of the restoration plan.
- Overview of protocols, policies, and procedures for service restoration (e.g., means and methods for assessing conditions, decision-making framework, prioritizations, degree of customization). This must include:
    - An operational flow diagram illustrating key components of the service restoration procedures from the moment of the incident to response, recovery, and restoration of service.
- Resource planning and allocation (e.g., staffing, equipment).
- Drills, simulations, and tabletop exercises.
- Coordination and collaboration with public safety partners (e.g., interoperable communications).
- Notification of and communication to customers during and after a wildfire- or PSPS-related outage.

The electrical corporation may refer to its Public Utilities Code section 768.6 emergency preparedness plan to provide more detail. Where the electrical corporation has already reported the requested information in another section of the WMP, it must provide a cross-reference with a hyperlink to that section. The overview must be no more than one page.

Reference the Utility Initiative Tracking ID where appropriate.

8.4.5.2 Planning and Allocation of Resources

The electrical corporation must briefly describe its methods for planning appropriate resources (e.g., equipment, specialized workers), and allocating those resources to assure the safety of the public during service restoration.

In addition, the electrical corporation must provide an overview of its plans for contingency measures regarding the resources required to respond to an increased number of reports

concerning unsafe conditions and expedite a response to a wildfire- or PSPS-related power outage.

This must include a brief narrative on how the electrical corporation:

- Uses weather reports to pre-position manpower and equipment before anticipated severe weather that could result in an outage
- Sets priorities
- Facilitates internal and external communications
- Restores service

The narrative for this section must be no more than two pages.

8.4.5.3 Drills, Simulations, and Tabletop Exercises

Discussion-based and operational-based exercises enhance knowledge of plans, allow personnel to improve their own performance, and identify opportunities to improve capabilities to respond to wildfire- and PSPS-related service outages. Exercises also provide a method to evaluate an electrical corporation's emergency preparedness plan and identify planning and/or procedural deficiencies.

Internal Exercises

The electrical corporation must report on its program(s) for conducting internal discussion-based and operations-based exercises for service restoration. This must include, at a minimum:

- The types of discussion-based exercises (e.g., seminars, workshops, tabletop exercises, games) and operations-based exercises (e.g., drills, functional exercises, full-scale exercises)
- The purpose of the exercises
- The schedule and frequency of exercise programs
- The percentage of staff who have completed/participated in exercises
- How the electrical corporation tracks who has completed the exercises

Table 8-51 provides an example of the minimum acceptable level of information.

External Exercises

The electrical corporation must report on its program(s) for conducting external discussion-based and operations-based exercises for service restoration due to wildfire. This must include, at a minimum:

- The types of discussion-based exercises (e.g., seminars, workshops, tabletop exercises, games) and operations-based exercises (e.g., drills, functional exercises, full-scale exercises)
- The schedule and frequency of exercise programs
- The percentage of public safety partners who have participated in these exercises
- How the electrical corporation tracks who has completed the exercises

Table 8-52 provides an example of the minimum acceptable level of information.

Table 8-51. Example of Internal Drill, Simulation, and Tabletop Exercise Program for Service Restoration

Category	Exercise Title and Type	Purpose	Exercise Frequency	Position of Title of Personnel Required to Participate	Personnel Required	Personnel Completed	Form of Verification or Reference
Discussion-based	PSPS event tabletop exercise	• Provide electrical corporation a way to determine its readiness to respond to a PSPS event • Clarify gaps or problems with existing policies and plans • Help administration and staff understand their roles during a PSPS event. • Serve as a training tool • Help identify needs for other resources • Serve as a tool for modifying and improving existing PSPS plans based on the lessons learned during the exercise	Annually	• Program Director of Emergency Planning • Grid Operations Program Manager and supervisors • Emergency Operations Center Supervisor • Public Information Officer	10	10	Exercise scoping materials and completion logs
Operations-based	Wildfire emergency drill		Annually (before September 1)	• Program Director of Emergency Planning • Grid Operations Program Manager and supervisors • Emergency Operations Center Supervisor and staff • Public Information Officer • Electrical corporation fire chief	20	19	Exercise scoping materials and completion logs

Table 8-52. Example of External Drill, Simulation, and Tabletop Exercise Program for Service Restoration

Category	Exercise Title and Type	Purpose	Exercise Frequency	Position or Title of Personnel Required to Participate	Personnel Required	Personnel Completed	Form of Verification or Reference
Discussion-based	PSPS event tabletop exercise	• Provide electrical corporation and public safety partners a way to determine their readiness to respond and recover from a PSPS event • Clarify gaps or problems with existing MAAs and MOAs, policies, and plans • Help electrical corporation and public safety partners understand their roles during a PSPS event • Serve as a training tool • Help identify needs for other resources • Serve as a tool for modifying and improving existing PSPS coordination and emergency response plans based on the lessons learned during the exercise	Annually	• Program Director of Emergency Planning • Grid Operations Program Manager and supervisors • Emergency Operations Center Supervisor • Fire chief(s) or liaison • Police, sheriff, and CHP chief(s) or liaisons • County Health liaison • American Red Cross liaison • Emergency Operations Supervisor(s) for relevant city/county jurisdictions	20	18	Exercise scoping materials and completion logs
Operations-based	Wildfire emergency drill		Annually (before September 1)	• Program Director of Emergency Planning • Grid Operations Program Manager and supervisors • Emergency Operations Center Supervisor • Electrical corporation fire chief and fire marshal • Fire chief(s) or liaison • Police, sheriff, and CHP chiefs or liaisons	20	19	Exercise scoping materials and completion logs

8.4.6 Customer Support in Wildfire and PSPS Emergencies

In this section of the WMP, the electrical corporation must provide an overview of its programs, systems, and protocols to support residential and non-residential customers in wildfire emergencies and PSPS events. The overview for each emergency service must be no more than one page. At a minimum, the overview must cover the following customer emergency services, per Public Utilities Code section 8386(c)(21):

- Outage reporting
- Support for low-income customers
- Billing adjustments
- Deposit waivers
- Extended payment plans
- Suspension of disconnection and nonpayment fees
- Repair processing and timing
- List and description of community assistance locations and services
- Medical Baseline support services
- Access to electrical corporation representatives

Reference the Utility Initiative Tracking ID where appropriate.

8.5 Community Outreach and Engagement

8.5.1 Overview

In accordance with California Public Utilities Code section 8386(c)(19)(B) each electrical corporation must provide its plans for community outreach and engagement before, during, and after a wildfire. The electrical corporation must also provide its plans for outreach and engagement related to PSPS, outages from protective equipment and device settings, and vegetation management.

In this section, the electrical corporation must identify objectives for the next 3- and 10-year periods, targets, and performance metrics related to the following community outreach and engagement mitigation initiatives:

- Public outreach and education awareness for wildfires, PSPS, outages from protective equipment and device settings, and vegetation management

- Public engagement in the WMP decision-making process
- Engagement with AFN populations, local governments, and tribal communities
- Collaboration on local wildfire mitigation and planning
- Best practice sharing with other electrical corporations from within and outside of California

8.5.1.1 Objectives

Each electrical corporation must summarize the objectives for its 3-year and 10-year plans for implementing and improving its community outreach and engagement.[41] These summaries must include the following:

- Identification of which initiative(s) in the WMP the electrical corporation is implementing to achieve the stated objective, including Utility Initiative Tracking IDs
- Reference(s) to applicable codes, standards, and best practices/guidelines and an indication of whether the electrical corporation exceeds an applicable code, standard, or regulation
- Method of verifying achievement of each objective
- A completion date for when the electrical corporation will achieve the objective
- Reference(s) to the WMP section(s) or appendix, including page numbers, where the details of the objective(s) are documented and substantiated

This information must be provided in Table 8-53 for the 3-year plan and Table 8-54 for the 10-year plan. Examples of the minimum acceptable level of information are provided below.

[41] Annual information included in this section must align with Tables 1 and 12 of the QDR.

Table 8-53. Example of Community Outreach and Engagement Initiative Objectives (3-year plan)

Objectives for Three Years (2023–2025)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Assess and resolve any customer issues identified through mobile application within 1 week	Public outreach and engagement, PE-01	Customer support guidance document	Records of open and closed customer tickets including dates	May 2024	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

Table 8-54. Example of Community Outreach and Engagement Initiative Objectives (10-year plan)

Objectives for Ten Years (2026–2032)	**Applicable Initiative(s), Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Formalize mechanism to share lessons learned among peers in and outside the state	Best practice sharing, CO-01	Guidance document for sharing data and information externally	Documented instances of collaboration between the electrical corporation and outside entities, including agendas, meeting minutes, and participant lists	June 2026	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

8.5.1.2 Targets

Initiative targets are forward-looking quantifiable measurements of activities identified by each electrical corporation in its WMP. Electrical corporations will show progress toward completing targets in subsequent reports, including QDRs and WMP Updates.

The electrical corporation must list all targets it will use to track progress on its community outreach and engagement for the three years of its Base WMP. Energy Safety's Compliance Assurance Division and third parties must be able to track and audit each target.[42] For each initiative target, the electrical corporation must provide the following:

- Utility Initiative Tracking IDs.
- Projected targets for each of the three years of the Base WMP and relevant units.
- Quarterly, rolling targets for 2023 and 2024 (PSPS outreach only).
- The expected "x% risk impact" for each of the three years of the Base WMP. The expected x% risk impact is the expected percentage risk reduction per year, as described in Section 7.2.2.2.
- Method of verifying target completion.

The electrical corporation's targets must provide enough detail to effectively inform efforts to improve the performance (i.e., reduction in ignition probability or wildfire consequence) of the electrical corporation's community outreach and engagement initiatives.

Table 8-55 and Table 8-56 provide examples of the minimum acceptable level of information.

[42] Annual information included in this section must align with Tables 1 and 12 of the QDR.

Table 8-55. Example of Community Outreach and Engagement Initiative Targets by Year

Initiative Activity	Tracking ID	2023 Target & Unit	x% Risk Impact 2023	2024 Target & Unit	x% Risk Impact 2024	2025 Target & Unit	x% Risk Impact 2025	Method of Verification
Hire additional customer support	PO-02	2 additional supervisors hired	0.01%	4 additional agents hired	0.01%	3 additional agents hired	0.01%	Hiring records and number of positions in workforce tracking platform showing before and after results

Table 8-56. Example of PSPS Outreach and Engagement Initiative Targets by Year

Initiative Activity	Tracking ID	Target End of Q2 2023 & Unit	Target End of Q3 2023 & Unit	End of Year Target 2023 & Unit	x% Risk Impact 2023	Target End of Q2 2024 & Unit	Target End of Q3 2024 & Unit	End of Year Target 2024 & Unit	x% Risk Impact 2024	Target 2025 & Unit	x% Risk Impact 2025	Method of Verification
Hold public meetings in high PSPS risk areas	PO-03	1 meeting	10 meetings	12 meetings	0.05%	3 meetings	15 meetings	20 meetings	0.1%	20 meetings	0.1%	Meeting agendas, meeting materials and attendance records

8.5.1.3 Performance Metrics Identified by the Electrical Corporation

Performance metrics indicate the extent to which an electrical corporation's Wildfire Mitigation Plan is driving performance outcomes. Each electrical corporation must:

- List the performance metrics the electrical corporation uses to evaluate the effectiveness of its community outreach and engagement in reducing wildfire and PSPS risk[43]

For each of those performance metrics listed, the electrical corporation must:

- Report the electrical corporation's performance since 2020 (if previously collected)
- Project performance for 2023-2025
- List method of verification

The electrical corporation must ensure that each metric's name and values are the same in its WMP reporting as its QDR reporting (specifically, QDR Table 2 and QDR Table 3). Metrics listed in this section that are the same as performance metrics required by Energy Safety and reported in QDR Table 2 (Performance Metrics)[44] must match those reported in QDR Table 2. Metrics listed in this section that are not the same as any of the performance metrics identified by Energy Safety and reported in QDR Table 2 must match those reported in QDR Table 3.

The electrical corporation must:

- Summarize its self-identified performance metric(s) in tabular form
- Provide a brief narrative that explains trends in the metrics

Table 8-57 provides an example of the minimum acceptable level of information.

[43] There may be overlap between the performance metrics the electrical corporation uses and performance metrics required by Energy Safety. The electrical corporation must list these overlapping metrics in this section in addition to any unique performance metrics it uses.
[44] The performance metrics identified by Energy Safety are included in Energy Safety's Data Guidelines.

Table 8-57. Example of Community Outreach and Engagement Performance Metrics Results by Year

Performance Metrics	2020	2021	2022	2023 Projected	2024 Projected	2025 Projected	Method of Verification (e.g., third-party evaluation, QDR)

8.5.2 Public Outreach and Education Awareness Program

The electrical corporation must provide a high-level overview of its public outreach and education awareness program(s) for wildfires; outages due to wildfires, PSPS events, and protective equipment and device settings; service restoration before, during, and after the incidents (as required by Public Utilities Code section 8386[c][19][B]); and vegetation management. This includes outreach efforts in English, Spanish, Chinese (including Cantonese, Mandarin, and other Chinese languages), Tagalog, and Vietnamese, as well as Korean and Russian where those languages are prevalent within the service territory.

At a minimum, the overview must include the following:

- A description of the purpose and scope of the program(s).
- References to the Utility Initiative Tracking ID where appropriate.
- A brief narrative followed by a tabulated list of all the different target communities it is trying to reach across the electrical corporation's service territory. The target communities list must include AFN and other vulnerable or marginalized populations, but they may also include other target populations, such as communities in different geographic locations (e.g., urban areas, rural areas), age groups, language and ethnic groups, transient populations, or Medical Baseline customers. In addition, the electrical corporation must summarize the interests or concerns each community may have before, during, or after a wildfire or PSPS event to help inform outreach and education awareness needs. Table 8-58 provides an example of the minimum acceptable level of information.
- A tabulated list of community partners the electrical corporation is working with or intends to work with to support its community outreach and education programs. Table 8-59 provides an example of the minimum acceptable level of information.
- A table of the various outreach and education awareness programs (i.e., campaigns, informal education, grant programs, participatory learning) that the electrical corporation implements before, during, and after wildfire, vegetation management, and PSPS events, including efforts to engage with partners in developing and exercising these programs. In addition, the electrical corporation must describe how it implements its overall program, including staff and volunteer needs, other resource needs, method for implementation (e.g., industry best practice, latest research in methods for risk communication, social marketing), long-term monitoring and

evaluation of each program's success, need for improvement, etc. The narrative for this section is limited to two to three pages. The electrical corporation must also provide the information on its outreach and education awareness programs a in tabulated format. Table 8-58 provides an example of the minimum acceptable level of information.

Table 8-58. Example of a List of Target Communities

Target Community	**Interests or Concerns Before, During, and After Wildfire and PSPS events**
Populations with limited English proficiency	Limited access to understand electrical corporation wildfire hazards and risks, specific actions that can be taken to reduce risk, and awareness of emergency services, resources, etc.
People in remote areas	[Electrical corporation to add description here]
Elderly	[Electrical corporation to add description here]
People with limited technology	[Electrical corporation to add description here]

Table 8-59. Example of a List of Community Partners

Community Partners	**County**	**City**
Regional Fire Safe Council	Local County	Local City
Emergency Relief Organization	Local County	Local City
Local City Government	Local County	Local City

Table 8-60. Example of Community Outreach and Education Programs

Core Activity	Event Type	Period of Application (Before, During, After Incident)	Name of Outreach or Education Program	Description of Program	Target Audience	Reference/ Link
Website information	Wildfire	Before	General Wildfire Safety	[Electrical corporation to insert description]	General public	http://www.corporation.com/wildfire-safety
Website information	PSPS	Before	Public Safety Power Shutoff	[Electrical corporation to insert description]	General public	
Website information	Wildfire	Before	Wildfire Safety Advancements	[Electrical corporation to insert description]	General public	
Website information	Vegetation Management	Before	Pre-inspection Notification	[Electrical corporation to insert description]	Customers along inspection route	
Website information	Wildfire and PSPS	Before	Community Resources	This website provides customers and the general public with locations of community resource centers throughout the service territory to provide support to customers affected by PSPS.	General public	
Safety webinars	Wildfire	Before	Community Wildfire Safety Program	These virtual gatherings allow community members to learn more about wildfire safety and emergency preparedness, meet with electrical corporation representatives, ask questions, and share feedback. Webinars are available in English, Spanish, Chinese, and Tagalog, as well as accessible versions for AFN customers, blind/low vision customers, deaf/hard of hearing customers, etc.	General public, AFN population, limited English proficiency (LEP) population	

8.5.3 Engagement with Access and Functional Needs Populations

In this section, the electrical corporation must provide an overview of its process for understanding, evaluating, designing, and implementing wildfire and PSPS risk mitigation strategies, policies, and procedures specific to AFN customers across its territory. The electrical corporation must also report, at a minimum, on the following:

- Summary of key AFN demographics, distribution, and percentage of total customer base.
- Evaluation of the specific challenges and needs during a wildfire or PSPS event of the electrical corporation's AFN customer base.
- Plans to address specific needs of the AFN customer base throughout the service territory specific to the unique threats that wildfires and PSPS events may pose for those populations before, during, and after the incidents. This should include high-level strategies, policies, programs, and procedures for outreach, engagement in the development and implementation of the AFN-specific risk mitigation strategies, and ongoing feedback practices.

Reference the Utility Initiative Tracking ID where appropriate.

8.5.4 Collaboration on Local Wildfire Mitigation Planning

In this section, the electrical corporation must provide a high-level overview of its plans, programs, and/or policies for collaborating with communities on local wildfire mitigation planning (e.g., wildfire safety elements in general plans, community wildfire protection plans, local multi-hazard mitigation plans) within its service territory. The narrative must be no more than one page.

In addition, the electrical corporation must provide the following information in tabular form, providing no more than one page of tabulated information in the main body of the WMP and the full table in an Appendix as needed.

- List of county, city, and tribal agencies and non-governmental organizations (e.g., nonprofits, fire safe councils) within the service territory with which the electrical corporation has collaborated or intends to collaborate on local wildfire mitigation planning efforts (i.e., non-wildfire emergency planning activities)

  - For each entity, the local wildfire mitigation planning program/plan/document, level of collaboration (e.g., meeting attendance, verbal or written comments), and date the electrical corporation provided its last feedback. Table 8-61 provides an example of the minimum acceptable level of information. Reference the Utility Initiative Tracking ID where appropriate.
- In a separate table, the electrical corporation must provide a list of current gaps and limitations in its collaboration efforts with local partners on local wildfire planning efforts. Where gaps or limitations exist, the electrical corporation must indicate proposed means and methods to increase collaborative efforts. Table 8-62 provides an example of the minimum acceptable level of information.

Table 8-61. Example of Collaboration in Local Wildfire Mitigation Planning

Name of County, City, or Tribal Agency or Civil Society Organization (e.g., nongovernmental organization, fire safe council)	**Program, Plan, or Document**	**Last Version of Collaboration**	**Level of Collaboration**
Local County Resource Management Agency	Local County General Plan, Safety Element, Wildfires	2022 version (06/2021)	Attended a virtual meeting on 02/02/2022 at 1 pm PDT Provided verbal comments and input
Local Fire Safe Council	Structural hardening grant program	2021/2022	Financier
Local County Resource Conservation District	Chipper program	Planned for 12/2023	Financier
Local Tribal Agency	Tribal Government Wildfire Safety Plan	2022 version (06/2021)	Attended a virtual meeting on

Name of County, City, or Tribal Agency or Civil Society Organization (e.g., nongovernmental organization, fire safe council)	Program, Plan, or Document	Last Version of Collaboration	Level of Collaboration
			02/02/2022 at 1 pm PDT Provided verbal comments and input

Table 8-62. Example of Key Gaps and Limitations in Collaborating on Local Wildfire Mitigation Planning

Subject of Gap or Limitation	**Brief Description of Gap or Limitation**	**Strategy for Improvement**
Low collaboration requests	Less than 5% of local government and civil society stakeholder groups seek collaboration activities.	**Strategy:** Create web content notifying the public, local government, and civil society organizations of the electrical corporation's resources to provide support on local wildfire mitigation planning efforts. Assign a local wildfire planning liaison to be available as needed for local planning efforts. **Target timeline**: Develop and post web content by May 2023 and hire two local wildfire planning liaisons by March 2023.

8.5.5 Best Practice Sharing with Other Electrical Corporations

In this section, the electrical corporation must provide a high-level overview of its policy for sharing best practices and collaborating with other electrical corporations on technical and programmatic aspects of its WMP program. The narrative must be no more than one page.

In addition, the electrical corporation must provide a list in tabular form of relevant electrical corporations and other entities it has shared or collaborated, or intends to continue to share or collaborate or begin sharing or collaborating, with on best practices for technical or programmatic aspects of its WMP program.

For each entity, the best practice subject, date(s) of collaboration, whether the collaboration is technical or programmatic, list of electrical corporation partners, a description of the best practice sharing/collaborative activity with a reference, and any outcomes from that sharing or activity.

Reference the Utility Initiative Tracking ID where appropriate.

The overview and table must be no longer than two pages in the main body of the WMP. The full table can be included as an appendix as needed.

Table 8-63 provides an example of the minimum acceptable level of information.

Table 8-64. Example of Best Practice Sharing with Other Electrical Corporations

Best Practice Subject	**Dates of Collaboration (YYYY–YYYY)**	**Technical or Programmatic**	**Electrical Corporation Partner(s)**	**Description of Best Practice Sharing or Collaborating**	**Outcome**
Covered conductor effectiveness	2020–Current	Technical	PGE, SCE, SDGE, Liberty, PacifiCorp, BVES	The IOUs commissioned a joint study to assess the effectiveness and reliability of covered conductors (CCs) for overhead distribution system hardening. The aim is to develop consistent criteria and measurements for evaluating effectiveness of CCs. Refer to the report entitled "Effectiveness of Covered Conductors: Failure Mode Identification and Literature Review," dated December 22, 2021, for more details.	Ongoing • CCs are a mature technology (in use since the 1970s) and have the potential to mitigate several safety, reliability, and wildfire risks inherent to bare conductors. This is due to the reduced vulnerability to arcing/faults afforded by the multi-layered polymeric insulating sheath material. • Of the 10 hazards that affect bare conductors, CCs have the potential to mitigate six (tree/vegetation contact, wind-induced contact, third-party damage, animal-related damage, public/worker impact, and moisture). • Laboratory studies and field experience have shown that CCs largely mitigated arcing due to external contact. • Several CC-specific failure modes exist that require operators to consider additional personnel training, augmented installation practices, and adoption of new mitigation strategies (e.g., additional lightning arrestors, conductor washing programs).

9. Public Safety Power Shutoff

9.1 Overview

In Sections 9.1–9.5 of the WMP,[45] the electrical corporation must:

- Provide a high-level overview of key PSPS statistics
- Identify circuits that have been frequently de-energized and provide measures for how the electrical corporation will reduce the need for, and impact of, future PSPS implementation on those circuits
- Describe expectations for how the electrical corporation's PSPS program will evolve over the next 3 and 10 years
- Describe any lessons learned for PSPS events occurring since the electrical corporation's last WMP submission
- Describe the electrical corporation's protocols for PSPS implementation

9.1.1 Key PSPS Statistics

In this section, the electrical corporation must include a summary table of PSPS event data. These data must be calculated from the same source used in the GIS data submission (i.e., they should be internally consistent). If it is not possible to provide these data from the same source, the electrical corporation must explain why. Table 9-1 provides an example of the minimum acceptable level of information for a summary of PSPS event data.

[45] Annual information included in the following sections must align with Table 10 of the QDR.

Table 9-1. Example of PSPS Event Statistics

	No. of Events	Total Circuits De-energized	Total Customers[46] Impacted	Total Customer Minutes of Interruption
[Beginning in first year of PSPS implementation by the electrical corporation]				
2020				
2021				
2022				

9.1.2 Identification of Frequently De-energized Circuits

Public Utilities Code section 8386(c)(8) requires the "[i]dentification of circuits that have frequently been de-energized pursuant to a PSPS event to mitigate the risk from wildfire and the measures taken, or planned to be taken, by the electrical corporation to reduce the need for, and impact of, future PSPS of those circuits, including, but not limited to, the estimated annual decline in circuit PSPS and PSPS impact on customers, and replacing, hardening, or undergrounding any portion of the circuit or of upstream transmission or distribution lines." To comply, the electrical corporation is required to populate Table 9-2 and provide a map showing the frequently de-energized circuits.

The map must show the following:

[46] Here, "customers" is customer accounts. The electrical corporation may use electric meters as a proxy for customers.

- All circuits listed in Table 9-2, colored or weighted by frequency of PSPS
- HFTD Tiers 2 and 3 contour overlay

Examples of the minimum acceptable level of information are provided in Table 9-2.

Table 9-2. Example of Frequently De-energized Circuits

Entry #	Circuit ID	Name of Circuit	Dates of Outages	Number of Customers Served by Circuit	Number of Customers Affected	Measures Taken, or Planned to Be Taken, to Reduce the Need for and Impact of Future PSPS of Circuit
1	157	Panama	Dec 2–4, 2021 Dec 7–9, 2022 Dec 23–24, 2022	1,500	1,220 600 500	• 34.26 miles of overhead hardening completed; 33 miles in scope for 2022/2023 • Eight SCADA (supervisory control and data acquisition) sectionalizing devices added or replaced
2	1215	Costa	Oct 27, 2018 Nov 12–14, 2020 Dec 2–4, 2021 Jan 28–29, 2022	1,200	300 250 542 600	• 0.78 miles of overhead hardening completed • Backup resiliency programs that have benefited 18 customers

Note: Once populated, if this table is longer than two pages, the electrical corporation must append the table.

9.1.3 Objectives

Each electrical corporation must summarize the objectives for its 3-year and 10-year plans to reduce the scale, scope, and frequency of PSPS events.[47] These summaries must include the following:

- Identification of which initiative(s) in the WMP the electrical corporation is implementing to achieve the stated objective, including Utility Initiative Tracking IDs
- Reference(s) to applicable codes, standards, and best practices/guidelines and an indication of whether the electrical corporation exceeds an applicable code, standard, or regulation
- Method of verifying achievement of each objective
- A completion date for when the electrical corporation will achieve the objective
- Reference(s) to the WMP section(s) or appendix, including page numbers, where the details of the objective(s) are documented and substantiated

This information must be provided in Table 9-3. Example of PSPS Objectives (3-year plan) for the 3-year plan and Table 9-4. Example of PSPS Objectives (10-year plan) for the 10-year plan. Examples of the minimum acceptable level of information are provided below.

[47] Annual information included in this section must align with Table 12 of the QDR.

Table 9-3. Example of PSPS Objectives (3-year plan)

Objectives for Three Years (2023–2025)	**Applicable Initiative(s) & Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Automate PSPS notifications to customers	Communication strategy for PSPS, PSPS-02	CPUC's PSPS guidelines and rules	Contract with communications firm to automate notifications; demonstration of automated process; post-event reports	September 2023	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

Table 9-4. Example of PSPS Objectives (10-year plan)

Objectives for Ten Years (2026–2032)	**Applicable Initiative(s) & Tracking ID(s)**	**Applicable Regulations, Codes, Standards, and Best Practices (See Note)**	**Method of Verification (i.e., program)**	**Completion Date**	**Reference (section & page #)**
Eliminate use of PSPS	Protocols on PSPS, PSPS-01	CPUC's PSPS guidelines and rules	Statement from executive officers; revised operational protocols	September 2030	

Note: An asterisk indicates that the electrical corporation exceeds a particular code, regulation, standard, or best practice. The electrical corporation must provide a reference to the appendix section and page providing further documentation, justification, and substantiation.

9.1.4 Targets

Initiative targets are forward-looking quantifiable measurements of activities identified by each electrical corporation in its WMP. Electrical corporations will show progress toward completing targets in subsequent reports, including QDRs and WMP Updates.

The electrical corporation must list all targets it uses to track progress on reducing the scope, scale, and frequency of PSPS for the three years of the Base WMP. Energy Safety's Compliance Assurance Division and third parties must be able to track and audit each target.[48] For each initiative target, the electrical corporation must provide the following:

- Utility Initiative Tracking IDs.
- Projected targets for the three years of the Base WMP and relevant units.
- The expected "x% risk impact" for each of the three years of the Base WMP. The expected x% risk impact is the expected percentage risk reduction per year, as described in Section 7.2.2.2.
- Method of verifying target completion.

The electrical corporation's targets must provide enough detail to effectively inform efforts to improve the performance of the electrical corporation's initiatives aimed at reducing the scope, scale, and frequency of its PSPS events.

Table 9-5 is an example of the minimum acceptable level of information.

[48] Annual information included in this section must align with Tables 1 and 12 of the QDR.

Table 9-5. Example of PSPS Targets

Initiative Activity	Tracking ID	2023 Target & Unit	x% Risk Impact 2023	2024 Target & Unit	x% Risk Impact 2024	2025 Target & Unit	x% Risk Impact 2025	Method of Verification
Install sectionalizing devices	PSPS-05	10 sectionalizing devices installed	2%	5 sectionalizing devices installed	1%	5 sectionalizing devices installed	1%	Completed work orders, GIS Data Submissions

9.1.5 Performance Metrics Identified by the Electrical Corporation

Performance metrics indicate the extent to which an electrical corporation's Wildfire Mitigation Plan is driving performance outcomes. Each electrical corporation must:

- List the performance metrics the electrical corporation uses to evaluate the effectiveness of reducing reliance on PSPS[49]

For each of these performance metrics listed, the electrical corporation must:

- Report the electrical corporation's performance since 2020 (if previously collected)
- Project performance for 2023-2025
- List method of verification

The electrical corporation must ensure that each metric's name and values are the same in its WMP reporting as its QDR reporting (specifically, QDR Table 2 and QDR Table 3). Metrics listed in this section that are the same as performance metrics required by Energy Safety and reported in QDR Table 2 (Performance Metrics)[50] must match those reported in QDR Table 2. Metrics listed in this section that are not the same as any of the performance metrics identified by Energy Safety and reported in QDR Table 2 must match those reported in QDR Table 3.

The electrical corporation must:

- Summarize its self-identified performance metric(s) in tabular form
- Provide a brief narrative that explains trends in the metrics

Table 9-6 provides an example of the minimum acceptable level of information.

In addition to the table, the electrical corporation must provide a narrative (two pages maximum) explaining its method for determining its projected performance on these metrics (e.g., PSPS consequence modeling, retrospective analysis).

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[49] There may be overlap between the performance metrics the electrical corporation uses and performance metrics required by Energy Safety. The electrical corporation must list these overlapping metrics in this section in addition to any unique performance metrics it uses.

[50] The performance metrics identified by Energy Safety are included in Energy Safety's Data Guidelines.

Table 9-6. Example of PSPS Performance Metrics Results by Year

Performance Metrics	2020	2021	2022	2023 Projected	2024 Projected	2025 Projected	Method of Verification (e.g., third-party evaluation, QDR)
Percentage of impacted customers notified at least 24 hours before a PSPS event							
Numbers of circuits de-energized							
Numbers of customers impacted							

9.2 Protocols on PSPS

The electrical corporation must describe its protocols on PSPS implementation including:

- Risk thresholds (e.g., wind speed, FPI, etc.) and decision-making process that determine the need for a PSPS. Where the electrical corporation provides this information in another section of the WMP, it must provide a cross-reference here rather than duplicating responses.
- Method used to compare and evaluate the relative consequences of PSPS and wildfires.
- Outline of the strategic decision-making process for initiating a PSPS (e.g., a decision tree). Where the electrical corporation provides this information in another section of the WMP, it must provide a cross-reference here rather than duplicating responses.
- Protocols for mitigating the public safety impacts of PSPS, including impacts on first responders, health care facilities, operators of telecommunications infrastructure, and water electrical corporations/agencies.

9.3 Communication Strategy for PSPS

In Section 8.4.4 of the WMP, the electrical corporation must discuss all public communication strategies for wildfires, outages due to wildfires and PSPS, and service restoration. Thus, in this section, the electrical corporation is only required to provide a cross-reference to Section 8.4.4 and any other section of the WMP providing details of the emergency public communication strategy for PSPS implementation.

9.4 Key Personnel, Qualifications, and Training for PSPS

In Section 8.4.2.2 of the WMP, the electrical corporation must discuss all key personnel planning, qualifications, and training for wildfires, outages due to wildfires, and PSPS, and service restoration. Thus, in this section, the electrical corporation is only required to provide a cross-reference to Section 8.4.2.2 and any other section of the WMP providing details of key personnel, qualifications, and training for PSPS implementation.

9.5 Planning and Allocation of Resources for Service Restoration due to PSPS

In Section 8.4.5.2 of the WMP, the electrical corporation must address planning of appropriate resources (e.g., equipment, specialized workers) and allocation of those resources to assure the safety of the public during service restoration. Thus, in this section, the electrical corporation is only required to provide a cross-reference to Section 8.4.5.2 and any other section of the WMP providing details of resource planning for PSPS implementation.

10. Lessons Learned

An electrical corporation must use lessons learned to drive continuous improvement in its WMP. Electrical corporations must include lessons learned due to ongoing monitoring and evaluation initiatives, collaboration with other electrical corporations and industry experts, and feedback from Energy Safety and other regulators.

The electrical corporation must provide a summary of new lessons learned since its most recent WMP submission, and any ongoing improvements to address existing lessons learned. This must include a brief narrative describing the new key lessons learned and a status update on any ongoing improvements due to existing lessons learned. The narrative should be limited to two pages.

The electrical corporation must also provide a summary of how it continuously monitors and evaluates its wildfire mitigation efforts to identify lessons learned. This must include various policies, programs, and procedures for incorporating feedback to make improvements.

Lessons learned can be divided into the three main categories: (1) internal monitoring and evaluation, (2) external collaboration with other electrical corporations, and (3) feedback from Energy Safety or other authoritative bodies. The following are examples of specific potential sources of lessons learned:

- Internal monitoring and evaluation initiatives:
  - Tracking of risk events
  - Findings from root cause analyses and after-action reviews
  - Drills and exercises
  - Feedback from community engagement
  - PSPS events
- Feedback from Energy Safety or other authoritative bodies:
  - Areas for continued improvement identified by Energy Safety in the previous WMP evaluation period
  - Findings from wildfire investigations
  - Findings from Energy Safety Compliance Division assessments
- Collaborations with other electrical corporations

In addition to the above potential sources of lessons learned, the electric corporation must detail lessons learned from any and each catastrophic wildfire ignited by its facilities or equipment in the past 20 years, as listed in Section 5.3.2. The electric corporation must also detail specific mitigation measures implemented as a result of these lessons learned and demonstrate how the mitigation measures are being integrated into the electric corporation's wildfire mitigation strategy.

For each lesson learned, the electrical corporation must identify the following in Table 10-1:

- Year the lesson learned was identified
- Subject of the lesson learned
- Specific type or source of lesson learned (as identified in the bullet lists above)
- Brief description of the lesson learned that informed improvement to the WMP
- Brief description of the proposed improvement to the WMP and which initiative(s) or activity(s) the electrical corporation intends to add or modify
- Estimated timeline for implementing the proposed improvement
- Reference to the documentation that describes and substantiates the need for improvement including:
    - Where relevant, a hyperlinked section and page number in the appendix of the WMP
    - Where relevant, the title of the report, date of report, and link to the electrical corporation web page where the report can be downloaded
    - If any lessons learned were derived from quantifiable data, visual/graphical representations of these lessons learned in the supporting documentation

Table 10-1 provides an example of the minimum acceptable level of information.

Table 10-1. Example of Lessons Learned

ID #	Year of Lesson Learned	Subject	Type or Source of Lesson Learned	Description of Lesson Learned	Proposed WMP Improvement	Timeline for Implementation	Reference
1	2020	Collaboration with other electrical corporations	Risk modeling working group	Wildfire risk models need to establish standard weather and vegetative coverage scenarios, as well as extreme-event conditions, for design purposes and long-term contingency planning.	Continue ongoing engagement in wildfire risk modeling working group. Commission research at leading research and academic institutes to help inform standard key assumptions as the basis for long-term design of capital improvements and wildfire risk mitigation initiatives, as well as contingency planning for unexpected, extreme events and/or potential changes to environmental settings and other assumptions due to climate change.	Ongoing Concept design by 12/2022 Detailed design by 2025 Draft report by 2026 Final report by 2027	Weblink to wildfire risk modeling working group and summary report Weblink to electrical corporation's proposed research
2	2022	Feedback from Energy Safety	Area of continuous improvement	Fire risk models need updated ignition and consequence data; covered conductor research needs to be provided.	Cooperate and share best practices with agencies outside California. Increase efforts to disseminate data and update risk models to include actual ignition and consequence data and incorporation of fire suppression. Distribute benchmarking surveys to understand current state of covered conductor.	Operationalized by 12/2023	Title of covered conductor analysis report, dated MM/DD/YYYY; title of risk model analysis report, dated MM/DD/YYYY

11. Corrective Action Program

In this section, the electrical corporation must describe its corrective action program. The electrical corporation must present a summary description of the relevant portions of its existing procedures.

The electrical corporation must report on how it maintains a corrective action program to track formal actions and activities undertaken to:

- Prevent recurrence of risk events
- Address findings from wildfire investigations (both internal and external)
- Address findings from Energy Safety's Compliance Assurance Division (i.e., audits and notices of defect and violation)
- Address areas for continued improvement identified by Energy Safety as part of the WMP evaluation

The electrical corporation must report on how it reviews each improvement area in accordance with its corrective action program. At a minimum, the electrical corporation must:

- **Identify insufficient occurrence and response**: Identify targeted corrective actions for areas where the event occurrence, response, or feature was insufficient.
- **Identify actions to reduce recurrence**: Identify improvement actions (as applicable) to reduce the likelihood of recurrence, improve response/mitigation actions, or improve operational procedures or practices.
- **Track implementation**: Track the improvement action plan and schedule in the electrical corporation's action tracking system.
- **Improve external communication**: For areas where weaknesses were identified in the response of external agencies, develop a communication plan to share the information and conclusion with the responsible agency. The completion of this action and the agency's response must be documented.
- **Integrate lessons learned from across the industry**: Identify applicable generic lessons learned to improve the overall effectiveness of the electrical corporation WMP.

- **Share lessons learned with others**: Identify and communicate any significant generic lessons learned that should be disseminated broadly (i.e., to other electrical corporations and responsible regulatory authorities, such as Energy Safety or CAL FIRE).

The WMP should not include detailed corrective action plans for each risk event, finding, and/or improvement area. However, this documentation must be made available to Energy Safety upon request.

12. Notices of Violation and Defect

Within a Notice of Violation (NOV) or Notice of Defect (NOD), Energy Safety directs an electrical corporation to correct a violation or defect within a specific timeline, depending on the risk category of the violation or defect. The electrical corporation has 30 days to respond to the NOV or NOD and provide a plan for corrective action. Following completion of the corrective action, the electrical corporation must provide Energy Safety with documentation validating the resolution or correction of the identified violation or defect. Energy Safety includes the electrical corporation's response and the resolution status of any violations or defects in the summaries it provides to the CPUC.

In Table 12-1 of the WMP, the electrical corporation must provide a list of all open violations and defects as of January 1, 2023.

Table 12-1. Example of a List of Open Compliance Violations and Defects

ID	Type	Severity	Date of Notice	Date of Response	Summary Description of Violation/Defect	Estimated Completion Date[1]	Summary Description of Correction
NOD_ES_ATJ_20220101-01	Defect	Minor	1/31/2022	2/21/2022	Vegetation contacting guy wire on poles 123456789 and 987654321	1/31/2023	Vegetation to be removed from guy wires.
NOV_ES_ATJ_20220201-01	Violation	Moderate	3/14/2022	4/8/2022	QDR stated covered conductor installed on pole 123456789, but Energy Safety inspection found no covered conductor installed	5/3/2022	Error in reporting procedure led to inaccurate data in QDR. Procedure has been corrected.

[1] *Estimated date for completion of correction of NOV or NOD.*

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2023-2025 WILDFIRE MITIGATION PLAN TECHNICAL GUIDELINES

APPENDICIES

Appendix A: Definitions

Unless otherwise expressly stated, the following words and terms, for the purposes of these Guidelines, have the meanings shown in this chapter.

Terms Defined in Other Codes

Where terms are not defined in these Guidelines and are defined in the Government Code, Public Utilities Code, or California Public Resources Code, such terms have the meanings ascribed to them in those codes.

Terms Not Defined

Where terms are not defined through the methods authorized by this section, such terms have ordinarily accepted meanings such as the context implies.

Definition of Terms

Term	Definition
Access and functional needs population (AFN)	Individuals, including, but not limited to, those who have developmental or intellectual disabilities, physical disabilities, chronic conditions, or injuries; who have limited English proficiency or are non-English speaking; who are older adults, children, or people living in institutionalized settings; or who are low income, homeless, or transportation disadvantaged, including, but not limited to, those who are dependent on public transit or are pregnant. (California Government Code 8593.3(f)(1) and
Asset (utility)	Electric lines, equipment, or supporting hardware.
At-risk species	See “high-risk species.”
Benchmarking	A comparison between one electrical corporation’s protocols, technologies used, or mitigations implemented, and other electrical corporations’ similar endeavors.

Term	Definition
Calibration	Adjustment of a set of code input parameters to maximize the resulting agreement of the code calculations with observations in a specific scenario.[1]
Catastrophic wildfire	A fire that caused at least one death, damaged over 500 structures, or burned over 5,000 acres.
Circuit miles	The total length in miles of separate transmission and/or distribution circuits, regardless of the number of conductors used per circuit (i.e., different phases).
Consequence	The adverse effects from an event, considering the hazard intensity, community exposure, and local vulnerability.
Contact by object ignition likelihood	The likelihood that a non-vegetative object (such as a balloon or vehicle) will contact utility-owned equipment and result in an ignition.
Contact by vegetation ignition likelihood	The likelihood that vegetation will contact utility-owned equipment and result in an ignition.
Contractor	Any individual in the temporary and/or indirect employ of the electrical corporation whose limited hours and/or time-bound term of employment are not considered "full-time" for tax and/or any other purposes.
Critical facilities and infrastructure	Facilities and infrastructure that are essential to public safety and that require additional assistance and advance planning to ensure resiliency during PSPS events. These include the following: Emergency services sector: • Police stations • Fire stations • Emergency operations centers

[1] Adapted from T. G. Trucano, L. P. Swiler, T. Igusa, W. L. Oberkampf, and M. Pilch, 2006, "Calibration, validation, and sensitivity analysis: What's what," *Reliability Engineering and System Safety*, vol. 91, no. 10–11, pp. 1331–1357.

Term	Definition
	• Public safety answering points (e.g., 9-1-1 emergency services) Government facilities sector: • Schools • Jails and prisons Health care and public health sector: • Public health departments • Medical facilities, including hospitals, skilled nursing facilities, nursing homes, blood banks, health care facilities, dialysis centers, and hospice facilities (excluding doctors' offices and other non-essential medical facilities) Energy sector: • Public and private utility facilities vital to maintaining or restoring normal service, including, but not limited to, interconnected publicly owned electrical corporations and electric cooperatives Water and wastewater systems sector: • Facilities associated with provision of drinking water or processing of wastewater, including facilities that pump, divert, transport, store, treat, and deliver water or wastewater Communications sector: • Communication carrier infrastructure, including selective routers, central offices, head ends, cellular switches, remote terminals, and cellular sites Chemical sector: • Facilities associated with manufacturing, maintaining, or distributing hazardous materials and chemicals (including Category N-Customers as defined in D.01-06-085) Transportation sector:

Term	Definition
	• Facilities associated with transportation for civilian and military purposes: automotive, rail, aviation, maritime, or major public transportation (D.19-05-042 and D.20-05-051)
Customer hours	Total number of customers, multiplied by average number of hours (e.g., of power outage).
Danger tree	Any tree located on or adjacent to a utility right-of-way or facility that could damage utility facilities should it fall where (1) the tree leans toward the right-of-way, or (2) the tree is defective because of any cause, such as: heart or root rot, shallow roots, excavation, bad crotch, dead or with dead top, deformity, cracks or splits, or any other reason that could result in the tree or main lateral of the tree falling. (California Code of Regulation Title 14 § 895.1)
Data cleaning	Calibration of raw data to remove errors (including typographical and numerical mistakes).
Dead fuel moisture content	Moisture content of dead vegetation, which responds solely to current environmental conditions and is critical in determining fire potential.
Detailed inspection	In accordance with General Order (GO) 165, an inspection where individual pieces of equipment and structures are carefully examined, visually and through routine diagnostic testing, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each is rated and recorded.
Disaster	A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability, and capacity, leading to one or more of the following: human, material, economic, and environmental losses and impacts. The effect of the disaster

Term	Definition
	can be immediate and localized but is often widespread and could last a long time. The effect may test or exceed the capacity of a community or society to cope using its own resources. Therefore, it may require assistance from external sources, which could include neighboring jurisdictions or those at the national or international levels. (United Nations Office for Disaster Risk Reduction [UNDRR].)
Discussion-based exercise	Exercise used to familiarize participants with current plans, policies, agreements, and procedures or to develop new plans, policies, agreements, and procedures. Often includes seminars, workshops, tabletop exercises, and games.
Electrical corporation	Every corporation or person owning, controlling, operating, or managing any electric plant for compensation within California, except where the producer generates electricity on or distributes it through private property solely for its own use or the use of its tenants and not for sale or transmission to others.
Emergency	Any incident, whether natural, technological, or human caused, that requires responsive action to protect life or property but does not result in serious disruption of the functioning of a community or society. (FEMA/UNDRR.)
Enhanced inspection	Inspection whose frequency and thoroughness exceed the requirements of a detailed inspection, particularly if driven by risk calculations.
Equipment ignition likelihood	The likelihood that utility-owned equipment will cause an ignition through either normal operation (such as arcing) or failure.
Exercise	An instrument to train for, assess, practice, and improve performance in prevention, protection, response, and recovery capabilities in a risk-free environment. (FEMA.)

Term	Definition
Exposure	The presence of people, infrastructure, livelihoods, environmental services and resources, and other high-value assets in places that could be adversely affected by a hazard.
Fire ecology	A scientific discipline concerned with natural processes involving fire in an ecosystem and its ecological effects, the interactions between fire and the abiotic and biotic components of an ecosystem, and the role of fire as an ecosystem process.
Fire Potential Index (FPI)	Landscape scale index used as a proxy for assessing real-time risk of a wildfire under current and forecasted weather conditions.
Fire season	The time of year when wildfires are most likely for a given geographic region due to historical weather conditions, vegetative characteristics, and impacts of climate change. Each electrical corporation defines the fire season(s) across its service territory based on a recognized fire agency definition for the specific region(s) in California.
Frequency	The anticipated number of occurrences of an event or hazard over time.
Frequent PSPS events	Three or more PSPS events per calendar year per line circuit.
Fuel density	Mass of fuel (vegetation) per area that could combust in a wildfire.
Fuel management	Removal or thinning of vegetation to reduce the potential rate of propagation or intensity of wildfires.
Fuel moisture content	Amount of moisture in a given mass of fuel (vegetation), measured as a percentage of its dry weight.
Full-time employee (FTE)	Any individual in the ongoing and/or direct employ of the electrical corporation whose hours and/or term of

Term	Definition
	employment are considered "full-time" for tax and/or any other purposes.
Game	A simulation of operations that often involves two or more teams, usually in a competitive environment, using rules, data, and procedures designed to depict an actual or assumed real-life situation.
Goals	The electrical corporation's general intentions and ambitions.
GO 95 nonconformance	Condition of a utility asset that does not meet standards established by GO 95.
Grid hardening	Actions (such as equipment upgrades, maintenance, and planning for more resilient infrastructure) taken in response to the risk of undesirable events (such as outages) or undesirable conditions of the electrical system to reduce or mitigate those events and conditions, informed by an assessment of the relevant risk drivers or factors.
Grid topology	General design of an electric grid, whether looped or radial, with consequences for reliability and ability to support PSPS (e.g., ability to deliver electricity from an additional source).
Hazard	A condition, situation, or behavior that presents the potential for harm or damage to people, property, the environment, or other valued resources.[3]
Hazard tree	See danger tree
High Fire Threat District (HFTD)	Areas of the state designated by the CPUC as having elevated wildfire risk, where each utility must take additional action (per GO 95, GO 165, and GO 166) to mitigate wildfire risk. (D.17-01-009.)
High Fire Risk Area (HFRA)	Areas that the electrical corporation has deemed at high risk from wildfire, independent of HFTD designation.

Term	Definition
Highly rural region	In accordance with 38 CFR 17.701, area with a population of less than seven persons per square mile, as determined by the United States Bureau of the Census. For purposes of the WMP, "area" must be defined as a census tract.
High-risk species	Species of vegetation that (1) have a higher risk of either coming into contact with powerlines or causing an outage or ignition, or (2) are easily ignitable and within close proximity to potential arcing, sparks, and/or other utility equipment thermal failures. The status of species as "high-risk" must be a function of species-specific characteristics, including growth rate; failure rates of limbs, trunk, and/or roots (as compared to other species); height at maturity; flammability; and vulnerability to disease or insects.
High Wind Warning (HWW)	Level of wind risk from weather conditions, as declared by the National Weather Service (NWS). For historical NWS data, refer to the Iowa State University archive of NWS watches/warnings.[2]
HWW overhead (OH) circuit mile day	Sum of OH circuit miles of utility grid subject to a HWW each day within a given time period, calculated as the number of OH circuit miles under a HWW multiplied by the number of days those miles are under said HWW. For example, if 100 OH circuit miles are under a HWW for one day, and 10 of those miles are under the HWW for an additional day, then the total HWW OH circuit mile days would be 110.
Ignition consequence	The total anticipated adverse effects from an ignition at each location in the electrical corporation service territory. This considers the likelihood that an ignition will transition into a wildfire (wildfire spread likelihood) and the consequences that the wildfire will have on each community it reaches (wildfire consequence).

[2] https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml.

Term	Definition
Ignition likelihood	The total anticipated annualized number of ignitions resulting from utility-owned assets at each location in the electrical corporation service territory. This considers probabilistic weather conditions, type and age of equipment, and potential contact of vegetation and other objects with utility assets.
Ignition probability	The relative possibility that an ignition will occur, quantified as a number between 0 percent (impossibility) and 100 percent (certainty). The higher the probability of an event, the more certainty there is that the event will occur. (Often informally referred to as likelihood or chance.)
Ignition risk	The total anticipated annualized impacts from ignitions at a specific location. This considers the likelihood that an ignition will occur, the likelihood the ignition will transition into a wildfire, and the potential consequences – considering hazard intensity, exposure potential, and vulnerability – the wildfire will have on each community it reaches.
Impact/consequence of ignition	The effect or outcome of a wildfire ignition upon objectives that may be expressed by terms including, although not limited to, maintaining health and safety, ensuring reliability, and minimizing economic and/or environmental damage.
Incident command system (ICS)	A standardized on-scene emergency management construct. It is specifically designed to provide an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. The ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents.
Initiative	Measure or activity, either proposed or in process, designed to reduce the consequences and/or probability of wildfire or PSPS.

Term	Definition
Integrated public alert warning system (IPAWS)	System allowing the President to send a message to the American people quickly and simultaneously through multiple communications pathways in a national emergency. IPAWS also is available to United States federal, state, local, territorial, and tribal government officials to alert the public via the Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), National Oceanic and Atmospheric Administration (NOAA) Weather Radio, and other NWS dissemination channels; the internet; existing unique warning systems; and emerging distribution technologies.
Invasive species	A species (1) that is non-native (or alien) to the ecosystem under consideration and (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.
Level 1 finding	In accordance with GO 95, an immediate safety and/or reliability risk with high probability for significant impact.
Level 2 finding	In accordance with GO 95, a variable safety and/or reliability risk (non-immediate and with high to low probability for significant impact).
Level 3 finding	In accordance with GO 95, an acceptable safety and/or reliability risk.
Limited English proficiency (LEP) population	Population with limited English working proficiency based on the International Language Roundtable scale.
Line miles	The number of miles of transmission and/or distribution conductors, including the length of each phase and parallel conductor segment.
Live fuel moisture content	Moisture content within living vegetation, which can retain water longer than dead fuel.

Term	Definition
Locally relevant	In disaster risk management, generally understood as the scale at which disaster risk strategies and initiatives are considered the most effective at achieving desired outcomes. This tends to be the level closest to impacting residents and communities, reducing existing risks, and building capacity, knowledge, and normative support. Locally relevant scales, conditions, and perspectives depend on the context of application.
Match-drop simulation	Wildfire simulation method forecasting propagation and consequence/impact based on an arbitrary ignition.
Memorandum of Agreement (MOA)	A document of agreement between two or more agencies establishing reciprocal assistance to be provided upon request (and if available from the supplying agency) and laying out the guidelines under which this assistance will operate. It can also be a cooperative document in which parties agree to work together on an agreed-upon project or meet an agreed objective.
Mitigation	Activities to reduce the loss of life and property from natural and/or human-caused disasters by avoiding or lessening the impact of a disaster and providing value to the public by creating safer communities.
Model uncertainty	The amount by which a calculated value might differ from the true value when the input parameters are known (i.e., limitation of the model itself based on assumptions).[3]
Multi-attribute value function (MAVF)	Risk calculation methodology introduced during CPUC's Safety Model Assessment Proceedings (S-MAP) and Risk Assessment and Mitigation Phase (RAMP) proceedings. This methodology is established in D.18-12-014 but may be subject to change pursuant to R.20-07-013.

[3] Adapted from SFPE, 2010, "Substantiating a Fire Model for a Given Application," *Society of Fire Protection Engineers Engineering Guides*.

Term	Definition
Mutual aid	Voluntary aid and assistance by the provision of services and facilities, including but not limited to electrical corporations, communication, and transportation. Mutual aid is intended to provide adequate resources, facilities, and other support to electrical corporations whenever their own resources prove inadequate to cope with a given situation.
National Incident Management System (NIMS)	A systematic, proactive approach to guide all levels of government, nongovernment organizations, and the private sector to work together to prevent, protect against, mitigate, respond to, and recover from the effects of incidents. NIMS provides stakeholders across the whole community with the shared vocabulary, systems, and processes to successfully deliver the capabilities described in the National Preparedness System. NIMS provides a consistent foundation for dealing with all incidents, ranging from daily occurrences to incidents requiring a coordinated federal response.
Near miss	Term previously used for an event with probability of ignition (now “Risk event”).
Objectives	Specific, measurable, achievable, realistic, and timely outcomes for the overall WMP strategy, or mitigation initiatives and activities that a utility can implement to satisfy the primary goals and subgoals of the WMP program.
Operations-based exercise	Type of exercise that validates plans, policies, agreements, and procedures; clarifies roles and responsibilities; and identifies resource gaps in an operational environment. Often includes drills, functional exercises (FEs), and full-scale exercises (FSEs).
Overall utility risk	The comprehensive risk due to both wildfire and PSPS incidents across a utility’s territory; the aggregate potential of adverse impacts to people, property, critical infrastructure, or other valued assets in society.

Term	Definition
Overall utility risk, ignition risk	See Ignition risk.
Overall utility risk, PSPS risk	See PSPS risk.
Parameter uncertainty	The amount by which a calculated value might differ from the true value based on unknown input parameters. (Adapted from Society of Fire Protection Engineers [SFPE] guidance.)
Patrol inspection	In accordance with GO 165, a simple visual inspection of applicable utility equipment and structures designed to identify obvious structural problems and hazards. Patrol inspections may be carried out in the course of other company business.
Performance metric	A quantifiable measurement that is used by an electrical corporation to indicate the extent to which its WMP is driving performance outcomes.
Population density	Population density is calculated using the American Community Survey (ACS) one-year estimate for the corresponding year or, for years with no such ACS estimate available, the estimate for the immediately preceding year.
Preparedness	A continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action in an effort to ensure effective coordination during incident response. Within the NIMS, preparedness focuses on planning, procedures and protocols, training and exercises, personnel qualification and certification, and equipment certification.
Priority essential services	Critical first responders, public safety partners, critical facilities and infrastructure, operators of telecommunications infrastructure, and water electrical corporations/agencies.
Property	Private and public property, buildings and structures, infrastructure, and other items of value that may be destroyed

Term	Definition
	by wildfire, including both third-party property and utility assets.
Protective equipment and device settings	The electrical corporation's procedures for adjusting the sensitivity of grid elements to reduce wildfire risk, other than automatic reclosers (such as circuit breakers, switches, etc.). For example, PG&E's "Enhanced Powerline Safety Settings" (EPSS).
PSPS consequence	The total anticipated adverse effects of a PSPS for a community. This considers the PSPS exposure potential and inherent PSPS vulnerabilities of communities at risk.
PSPS event	The period from notification of the first public safety partner of a planned public safety PSPS to re-energization of the final customer.
PSPS exposure potential	The potential physical, social, or economic impact of a PSPS event on people, property, critical infrastructure, livelihoods, health, local economies, and other high-value assets.
PSPS likelihood	The likelihood of a PSPS being required by a utility given a probabilistic set of environmental conditions.
PSPS risk	The total anticipated annualized impacts from a PSPS event at a specific location. This considers the likelihood a PSPS event will be required due to environmental conditions exceeding design conditions and the potential consequences – considering exposure potential and vulnerability – of the PSPS event for each affected community.
Public safety partners	First/emergency responders at the local, state, and federal levels; water, wastewater, and communication service providers; community choice aggregators (CCAs); affected publicly owned electrical corporations/electrical cooperatives; tribal governments; Energy Safety; the Commission; the California Office of Emergency Services; and CAL FIRE.

Term	Definition
Red Flag Warning (RFW)	Level of wildfire risk from weather conditions, as declared by the NWS. For historical NWS data, refer to the Iowa State University archive of NWS watches/warnings.[4]
RFW OH circuit mile day	Sum of OH circuit miles of utility grid subject to RFW each day within a given time period, calculated as the number of OH circuit miles under RFW multiplied by the number of days those miles are under said RFW. For example, if 100 OH circuit miles are under RFW for one day, and 10 of those miles are under RFW for an additional day, then the total RFW OH circuit mile days would be 110.
Risk	A measure of the anticipated adverse effects from a hazard considering the consequences and frequency of the hazard occurring.[5]
Risk component	A part of an electric corporation's risk analysis framework used to determine overall utility risk.
Risk evaluation	The process of comparing the results of a risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable. (ISO 31000:2009.)
Risk event	An event with probability of ignition, such as wire down, contact with objects, line slap, event with evidence of heat generation, or other event that causes sparking or has the potential to cause ignition. The following all qualify as risk events: • Ignitions • Outages not caused by vegetation • Outages caused by vegetation

[4] https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml.

[5] Adapted from D. Coppola, 2020, "Risk and Vulnerability," *Introduction to International Disaster Management*, 4th ed.

Term	Definition
	• Wire-down events • Faults • Other events with potential to cause ignition
Risk management	Systematic application of management policies, procedures, and practices to the tasks of communication, consultation, establishment of context, and identification, analysis, evaluation, treatment, monitoring, and review of risk. (ISO 31000.)
Rule	Section of Public Utilities Code requiring a particular activity or establishing a particular threshold.
Rural region	In accordance with GO 165, area with a population of less than 1,000 persons per square mile, as determined by the U.S. Bureau of the Census.[6] For purposes of the WMP, "area" must be defined as a census tract.
Seminar	An informal discussion, designed to orient participants to new or updated plans, policies, or procedures (e.g., to review a new external communications standard operating procedure).
Sensitivity analysis	Process used to determine the relationships between the uncertainty in the independent variables ("input") used in an analysis and the uncertainty in the resultant dependent variables ("output"). (SFPE guidance.)
Slash	Branches or limbs less than four inches in diameter, and bark and split products debris left on the ground as a result of utility vegetation management. (This definition is consistent with California Public Resources Code section 4525.7.)
Span	The space between adjacent supporting poles or structures on a circuit consisting of electric lines and equipment. "Span level" refers to asset-scale granularity.

[6] https://www.cpuc.ca.gov/gos/GO95/go_95_rule_18.htm

Term	Definition
Tabletop exercise (TTX)	A discussion-based exercise intended to stimulate discussion of various issues regarding a hypothetical situation. Tabletop exercises can be used to assess plans, policies, and procedures or to assess types of systems needed to guide the prevention of, response to, or recovery from a defined incident.
Target	A forward-looking, quantifiable measurement of work to which an electrical corporation commits to in its WMP. Electrical corporations will show progress toward completing targets in subsequent reports, including QDRs and WMP Updates.
Trees with strike potential	Trees that could either "fall in" to a power line or have branches detach and "fly in" to contact a power line in high-wind conditions.
Uncertainty	The amount by which an observed or calculated value might differ from the true value. For an observed value, the difference is "experimental uncertainty"; for a calculated value, it is "model" or "parameter uncertainty." (Adapted from SFPE guidance.)
Urban region	In accordance with GO 165, area with a population of more than 1,000 persons per square mile, as determined by the U.S. Bureau of the Census. For purposes of the WMP, "area" must be defined as a census tract.
Utility-related ignition	See reportable ignition.
Validation	Process of determining the degree to which a calculation method accurately represents the real world from the perspective of the intended uses of the calculation method without modifying input parameters based on observations in a specific scenario. (Adapted from ASTM E 1355.)
Vegetation management (VM)	Trimming and removal of trees and other vegetation at risk of contact with electric equipment.

Term	Definition
Verification	Process to ensure that a model is working as designed, that is, that the equations are being properly solved. Verification is essentially a check of the mathematics. (SFPE guidance.)
Vulnerability	The propensity or predisposition of a community to be adversely affected by a hazard, including the characteristics of a person, group, or service and their situation that influences their capacity to anticipate, cope with, resist, and recover from the adverse effects of a hazard.
Wildfire consequence	The total anticipated adverse effects from a wildfire on a community that is reached. This considers the wildfire hazard intensity, the wildfire exposure potential, and the inherent wildfire vulnerabilities of communities at risk.
Wildfire exposure potential	The potential physical, social, or economic impact of wildfire on people, property, critical infrastructure, livelihoods, health, environmental services, local economies, cultural/historical resources, and other high-value assets. This may include direct or indirect impacts, as well as short- and long-term impacts.
Wildfire intensity	The potential intensity of a wildfire at a specific location within the service territory given a probabilistic set of weather profiles, vegetation, and topography.
Wildfire mitigation strategy	Overview of the key mitigation initiatives at enterprise level and component level across the electrical corporation's service territory, including interim strategies where long-term mitigation initiatives have long implementation timelines. This includes a description of the enterprise-level monitoring and evaluation strategy for assessing overall effectiveness of the WMP.
Wildfire risk	See Ignition risk.
Wildfire spread likelihood	The likelihood that a fire with a nearby but unknown ignition point will transition into a wildfire and will spread to a location

Term	Definition
	in the service territory based on a probabilistic set of weather profiles, vegetation, and topography.
Wildland-urban interface (WUI)	The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels (National Wildfire Coordinating Group). Enforcement agencies also designate the WUI as the area at significant risk from wildfires, established pursuant to Title 24, Part 2, Chapter 7A.
Wire down	Instance where an electric transmission or distribution conductor is broken and falls from its intended position to rest on the ground or a foreign object.
Work order	A prescription for asset or vegetation management activities resulting from asset or vegetation management inspection findings.
Workshop	Discussion that resembles a seminar but is employed to build specific products, such as a draft plan or policy (e.g., a multi-year training and exercise plan).

Definitions of Initatives by Category

Category	Section #	Initiative	Definition
Overview of the Service Territory	5.4.5	Environmental compliance and permitting	Development and implementation of process and procedures to ensure compliance with applicable environmental laws, regulations, and permitting related to the implementation of the WMP.
Risk Methodology and Assessment	6	Risk Methodology and Assessment	Development and use of tools and processes to assess the risk of wildfire and PSPS across an electrical corporation's service territory.
Wildfire Mitigation Strategy Development	7	Wildfire Mitigation Strategy Development	Development and use of processes for deciding on a portfolio of mitigation initiatives to achieve maximum feasible risk reduction and that meet the goals of the WMP.
Grid Design, Operations, and Maintenance	8.1.2.1	Covered conductor installation	Installation of covered or insulated conductors to replace standard bare or unprotected conductors (defined in accordance with GO 95 as supply conductors, including but not limited to lead wires, not enclosed in a grounded metal pole or not covered by: a "suitable protective covering" (in accordance with Rule 22.8), grounded metal conduit, or grounded metal sheath or shield). In accordance with GO 95, conductor is defined as a material suitable for: (1) carrying electric current, usually in the form of a wire, cable or bus bar, or (2) transmitting light in the case of fiber optics; insulated conductors as those which are surrounded by an insulating material (in accordance with Rule 21.6), the dielectric strength of which is sufficient to withstand the

			maximum difference of potential at normal operating voltages of the circuit without breakdown or puncture; and suitable protective covering as a covering of wood or other non-conductive material having the electrical insulating efficiency (12kV/in. dry) and impact strength (20ft.-lbs) of 1.5 inches of redwood or other material meeting the requirements of Rule 22.8-A, 22.8-B, 22.8-C or 22.8-D.
Grid Design, Operations, and Maintenance	8.1.2.2	Undergrounding of electric lines and/or equipment	Actions taken to convert overhead electric lines and/or equipment to underground electric lines and/or equipment (i.e., located underground and in accordance with GO 128).
Grid Design, Operations, and Maintenance	8.1.2.3	Distribution pole replacements and reinforcements	Remediation, adjustments, or installations of new equipment to improve or replace existing distribution poles (i.e., those supporting lines under 65kV), including with equipment such as composite poles manufactured with materials reduce ignition probability by increasing pole lifespan and resilience against failure from object contact and other events.
Grid Design, Operations, and Maintenance	8.1.2.4	Transmission pole/tower replacements and reinforcements	Remediation, adjustments, or installations of new equipment to improve or replace existing transmission towers (e.g., structures such as lattice steel towers or tubular steel poles that support lines at or above 65kV).
Grid Design, Operations, and Maintenance	8.1.2.5	Traditional overhead hardening	Maintenance, repair, and replacement of capacitors, circuit breakers, cross-arms, transformers, fuses, and connectors (e.g., hot line

			clamps) with the intention of minimizing the risk of ignition.
Grid Design, Operations, and Maintenance	8.1.2.6	Emerging grid hardening technology installations and pilots	Development, deployment, and piloting of novel grid hardening technology.
Grid Design, Operations, and Maintenance	8.1.2.7	Microgrids	Development and deployment of microgrids that may reduce the risk of ignition, risk from PSPS, and wildfire consequence. “Microgrid” is defined by Public Utilities Code section 8370(d).
Grid Design, Operations, and Maintenance	8.1.2.8	Installation of system automation equipment	Installation of electric equipment that increases the ability of the electrical corporation to automate system operation and monitoring, including equipment that can be adjusted remotely such as automatic reclosers (switching devices designed to detect and interrupt momentary faults that can reclose automatically and detect if a fault remains, remaining open if so).
Grid Design, Operations, and Maintenance	8.1.2.9	Line removals (in HFTD)	Removal of overhead lines to minimize the risk of ignition due to the design, location, or configuration of electric equipment in HFTDs.
Grid Design, Operations, and Maintenance	8.1.2.10	Other grid topology improvements to minimize risk of ignitions	Actions taken to minimize the risk of ignition due to the design, location, or configuration of electric equipment in HFTDs not covered by another initiative.
Grid Design, Operations, and Maintenance	8.1.2.11	Other grid topology improvements to mitigate or reduce PSPS events	Actions taken to mitigate or reduce PSPS events in terms of geographic scope and number of customers affected not covered by another initiative.

Grid Design, Operations, and Maintenance	8.1.2.12	Other technologies and systems not listed above	Other grid design and system hardening actions which the electrical corporation takes to reduce its ignition and PSPS risk not otherwise covered by other initiatives in this section.
Grid Design, Operations, and Maintenance	8.1.3.1	Asset inspections	Inspections of overhead electric transmission lines, equipment, and right-of-way.
Grid Design, Operations, and Maintenance	8.1.4	Equipment maintenance and repair	Remediation, adjustments, or installations of new equipment to improve or replace existing connector equipment, such as hotline clamps.
Grid Design, Operations, and Maintenance	8.1.5	Asset management and inspection enterprise system(s)	Operation of and support for centralized asset management and inspection enterprise system(s) updated based upon inspection results and activities such as hardening, maintenance, and remedial work.
Grid Design, Operations, and Maintenance	8.1.6	Quality assurance / quality control	Establishment and function of audit process to manage and confirm work completed by employees or contractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
Grid Design, Operations, and Maintenance	8.1.7	Open work orders	Actions taken to manage the electrical corporation's open work orders resulting from inspections that prescribe asset management activities.
Grid Design, Operations, and Maintenance	8.1.8.1	Equipment Settings to Reduce Wildfire Risk	The electrical corporation's procedures for adjusting the sensitivity of grid elements to reduce wildfire risk.
Grid Design, Operations, and Maintenance	8.1.8.2	Grid Response Procedures and Notifications	The electrical corporation's procedures it uses to respond to faults, ignitions, or other issues

			detected on its grid that may result in a wildfire.
Grid Design, Operations, and Maintenance	8.1.8.3	Personnel Work Procedures and Training in Conditions of Elevated Fire Risk	Work activity guidelines that designate what type of work can be performed during operating conditions of different levels of wildfire risk. Training for personnel on these guidelines and the procedures they prescribe, from normal operating procedures to increased mitigation measures to constraints on work performed.
Grid Design, Operations, and Maintenance	8.1.9	Workforce Planning	Programs to ensure that the electrical corporation has qualified asset personnel and to ensure that both employees and contractors tasked with asset management responsibilities are adequately trained to perform relevant work.
Vegetation Management and Inspection	8.2.2.1	Vegetation inspections	Inspections of vegetation around and adjacent to electrical facilities and equipment that may be hazardous by growing, blowing, or falling into electrical facilities or equipment.
Vegetation Management and Inspection	8.2.3.1	Pole clearing	Plan and execution of vegetation removal around poles per Public Resources Code section 4292 and outside the requirements of Public Resources Code section 4292 (e.g., pole clearing performed outside of the State Responsibility Area).
Vegetation Management and Inspection	8.2.3.2	Wood and slash management	Actions taken to manage all downed wood and “slash” generated from vegetation management activities.
Vegetation Management and Inspection	8.2.3.3	Clearance	Actions taken after inspection to ensure that vegetation does not encroach upon electrical equipment and facilities, such as tree trimming.
Vegetation Management and Inspection	8.2.3.4	Fall-in mitigation	Actions taken to identify and remove or otherwise remediate trees that pose a high risk of failure

			or fracture that could potentially strike electrical equipment.
Vegetation Management and Inspection	8.2.3.5	Substation defensible space	Actions taken to reduce ignition probability and wildfire consequence due to contact with substation equipment.
Vegetation Management and Inspection	8.2.3.6	High-risk species	Actions taken to reduce the ignition probability and wildfire consequence attributable to high-risk species of vegetation.
Vegetation Management and Inspection	8.2.3.7	Fire-resilient rights-of-way	Actions taken to promote vegetation communities that are sustainable, fire-resilient, and compatible with the use of the land as an electrical corporation right-of-way.
Vegetation Management and Inspection	8.2.3.8	Emergency response vegetation management	Planning and execution of vegetation activities in response to emergency situations including weather conditions that indicate an elevated fire threat and post-wildfire service restoration.
Vegetation Management and Inspection	8.2.4	Vegetation management enterprise system	Operation of and support for centralized vegetation management and inspection enterprise system(s) updated based upon inspection results and activities such as hardening, maintenance, and remedial work.
Vegetation Management and Inspection	8.2.5	Quality assurance / quality control	Establishment and function of audit process to manage and confirm work completed by employees or contractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
Vegetation Management and Inspection	8.2.6	Open work orders	Actions taken to manage the electrical corporation's open work orders resulting from inspections that prescribe vegetation management activities.

Vegetation Management and Inspection	8.2.7	Workforce planning	Programs to ensure that the electrical corporation has qualified vegetation management personnel and to ensure that both employees and contractors tasked with vegetation management responsibilities are adequately trained to perform relevant work.
Situational Awareness and Forecasting	8.3.2	Environmental monitoring systems	Development and deployment of systems which measure environmental characteristics, such as fuel moisture, air temperature, and velocity.
Situational Awareness and Forecasting	8.3.3	Grid monitoring systems	Development and deployment of systems that checks the operational conditions of electrical facilities and equipment and detects such things as faults, failures, and recloser operations.
Situational Awareness and Forecasting	8.3.4	Ignition detection systems	Development and deployment of systems which discover or identify the presence or existence of an ignition, such as cameras.
Situational Awareness and Forecasting	8.3.5	Weather forecasting	Development methodology for forecast of weather conditions relevant to electrical corporation operations, forecasting weather conditions and conducting analysis to incorporate into utility decision-making, learning and updates to reduce false positives and false negatives of forecast PSPS conditions.
Situational Awareness and Forecasting	8.3.6	Fire potential index	Calculation and application of a landscape scale index used as a proxy for assessing real-time risk of a wildfire under current and forecasted weather conditions.
Emergency Preparedness	8.4.2	Emergency preparedness plan	Development and integration of wildfire- and PSPS-specific emergency strategies, practices, policies, and procedures into the

			electrical corporation's overall emergency plan based on the minimum standards described in GO 166.
Emergency Preparedness	8.4.3	External collaboration and coordination	Actions taken to coordinate wildfire and PSPS emergency preparedness with relevant public safety partners including the state, cities, counties, and tribes.
Emergency Preparedness	8.4.4	Public emergency communication strategy	Development and integration of a comprehensive communication strategy to inform essential customers and other stakeholder groups of wildfires, outages due to wildfires, and PSPS and service restoration, as required by Public Utilities Code section 768.6.
Emergency Preparedness	8.4.5	Preparedness and planning for service restoration	Development and integration of the electrical corporation's plan to restore service after an outage due to a wildfire or PSPS event.
Emergency Preparedness	8.4.6	Customer support in wildfire and PSPS emergencies	Development and deployment of programs, systems, and protocols to support residential and non-residential customers in wildfire emergencies and PSPS events.
Community Outreach and Engagement	8.5.2	Public outreach and education awareness program	Development and deployment of public outreach and education awareness program(s) for wildfires; outages due to wildfires, PSPS events, and protective equipment and device settings; service restoration before, during, and after the incidents and vegetation management.
Community Outreach and Engagement	8.5.3	Engagement with access and functional needs populations	Actions taken understand, evaluate, design, and implement wildfire and PSPS risk mitigation strategies, policies, and procedures specific to access and functional needs customers.

Community Outreach and Engagement	8.5.4	Collaboration on local wildfire mitigation planning	Development and integration of plans, programs, and/or policies for collaborating with communities on local wildfire mitigation planning, such as wildfire safety elements in general plans, community wildfire protection plans, and local multi-hazard mitigation plans.
Community Outreach and Engagement	8.5.5	Best practice sharing with other utilities	Development and integration of an electrical corporation's policy for sharing best practices and collaborating with other electrical corporations on technical and programmatic aspects of its WMP program.

Appendix B: Supporting Documentation for Risk Methodolgy and Assesment

Note: As part of its 2023-2025 WMP, the electrical corporation is required to provide the "Summary Documentation" as defined by this appendix. For all other requirements in this appendix, the electrical corporation must be readily able to provide the defined documentation in response to a data request by Energy Safety or designated stakeholders.

The risk modeling and assessment in the main body of these Guidelines and electrical corporation's WMP are focused on providing a streamlined overview of the electrical corporation risk framework and key findings from the assessment necessary to understand the wildfire mitigation strategy presented in Section 7.

The focus of this appendix is to provide additional information pertaining to the risk modeling approach used by the electrical corporation. This includes the following:

- Additional detail on model calculations supporting the calculation of risk and risk components
- Additional detail on the calculation of risk and risk components
- More detailed presentation of the risk findings

The following sections establish the reporting requirements for the approaches used by the electrical corporation to calculate each risk and risk component. These have been synthesized and adapted from guidance documents on model quality assurance developed by many agencies, with a focus on guidance related to machine learning, artificial intelligence, and fire science and engineering. These guidance documents include those from the Institute of Electrical and Electronics Engineers (IEEE),[7] the Society of Fire Protection

[7] IEEE, 2022, "P2841/D2: Draft Framework and Process for Deep Learning Evaluation."

Engineers (SFPE),[8] the American Society for Testing and Materials (ASTM International),[9] the U.S. Nuclear Regulatory Commission (NRC),[10] the Electric Power Research Institute (EPRI),[52] the National Institute of Standards and Technology (NIST),[11] and the International Organization for Standardization (ISO).[12]

Summary Documentation

The electrical corporation must provide high-level information on the calculation of each risk and risk component used in its risk analysis. The summary documentation must include each of the following:

- **High-level bow tie schematic** showing the inputs, outputs, and interaction between risk components in the format shown in Figure B-1. An example is provided below.
- **High-level calculation procedure schematic** in the format shown in Figure B-2. This schematic must show the logical flow from input data to outputs, including separate items for any intermediate calculations in models or sub-models and any input from subject matter experts.

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[8] SFPE, 2010, "Substantiating a Fire Model for a Given Application," Engineering Guides.

[9] ASTM, 2005, "ASTM E1472: Standard Guide for Documenting Computer Software for Fire Models," ASTM International.

ASTM, 2005, "ASTM E1895: Standard Guide for Determining Uses and Limitations of Deterministic Fire Models," ASTM International.

ASTM, 2005, "ASTM E1355: Standard Guide for Evaluating the Predictive Capability of Deterministic Fire Models," ASTM International.

[10] U.S. NRC, EPRI, Jensen Hughes, NIST, 2016, "NUREG-1824: Verification and Validation of Selected Fire Models for Nuclear Power Plant Applications. Supplement 1."

U.S. NRC, EPRI, Hughes Associates, Inc., NIST, California Polytechnic State University, Westinghouse Electric Company, University of Maryland, Science Applications International Corporation, ERIN Engineering, 2012, "NUREG-1934: Nuclear Power Plant Fire Modeling Application Guide."

[11] NIST, 1981, "NBS SP 500-73: Computer Model Documentation Guide."

[12] ISO, 2013, "ISO/TR 16730:2013: Fire Safety Engineering: Assessment, Verification and Validation of Calculation Methods."

ISO, 2021, "ISO/IEC TR 24027:2021: Information Technology: Artificial Intelligence (AI) – Bias in AI Systems and AI Aided Decision Making."

ISO, 2021, "ISO/IEC TR 24029:2021: Artificial Intelligence (AI): Assessment of the Robustness of Neural Networks."

- **High-level narrative describing the calculation procedure** in a concise executive summary. This narrative must include the following:
    - Purpose of the calculation/model
    - Assumptions and limitations
    - Description of the calculation procedure shown in the bow tie and high-level schematics
    - Description of how outputs will be characterized and presented (e.g., visualization) to decision makers
    - Concise description and timeline of planned changes to the calculation procedure over the triennial WMP cycle, including any key improvements from the Energy Safety Wildfire Risk Modeling Working Group and plans to align with the consensus Risk Modeling Requirements by January 1, 2024.

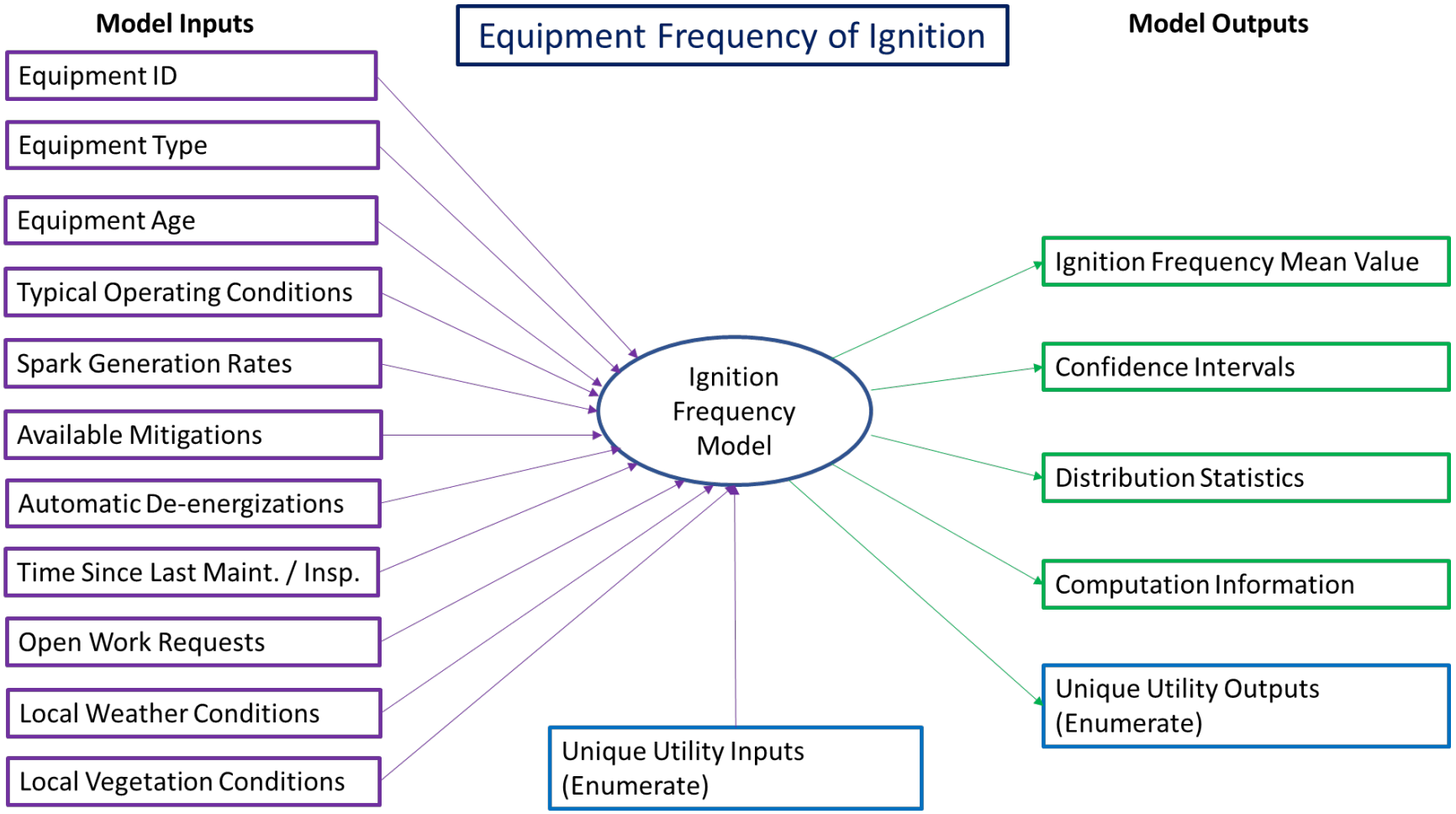

Figure B-1. Example Bow Tie Schematic

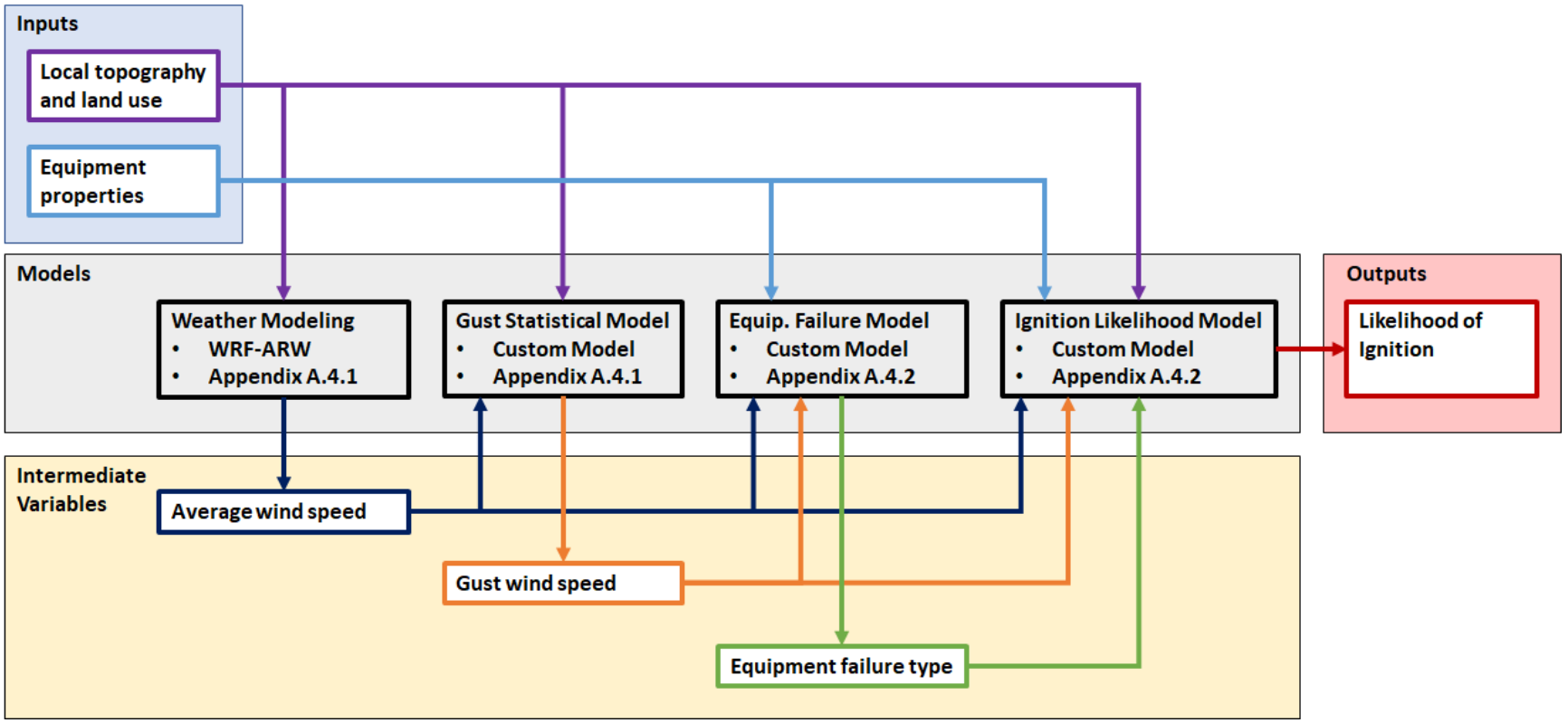

Figure B-2. Example Calculation Schematic

Detailed Model Documentation

The electrical corporation must be readily able to provide, if requested by Energy Safety or designated stakeholders, detailed documentation for each model and sub-model discussed in the summary documentation. The electrical corporation should not provide this information as part of its WMP submission. At a minimum, this documentation to be made available on request must include each of the following:

- **Purpose of the model / problem identification:**
  - Define the objectives/goals of the model.
  - Summarize and define the relevant outcomes to be predicted by the model.
  - Define the circumstances in which the model is to be used.
  - Time horizon (i.e., real time, annual planning, or both)
  - Spatial scales (i.e., service territory, region, local)
  - Deterministic (specific forecasts) or probabilistic (statistical)
- **Model version:**
  - Provide the name and version number of the software, including major and minor release number. Provide version control (git) commit level if available.
  - Document any utility-specific changes to the model and provide the reason for the change(s).
- **Theoretical foundation:**
  - Describe the theoretical basis of the model and the governing equations or physical laws on which the model is based.
  - Identify assumptions made in the model, their impact in the governing equations, and resulting limitations.
- **Mathematical foundation:**
  - Describe numerical techniques and computational algorithms used to solve/approximate the governing equations.
  - Describe the precision of the results and any reliance on specific computing hardware or facilities.
  - Discuss model convergence criteria, studies, and resulting grid resolution required to meet the criteria.

  - Identify any additional limitations in the model based on the numerical techniques and implementation.

- **External dependencies:**
  - Describe external programs or software libraries used by the software.
  - Describe data used by the software, including utility-collected and external sources. This should include the following:
  - Characteristics of the data (field definitions/schema, uncertainties, acquisition frequency).
  - Scope and granularity (or resolution) of data in time and location (i.e., date range, spatial granularity for each data element).
  - Sources of data, frequency of data updates, and verification of data quality. Explain in detail measurement approaches and procedures.
  - Any processes used to modify the data (such as adjusting vegetative fuel models for wildfire spread based on prior history and vegetation growth).
- **Model substantiation:**
  - Identify existing data that can be used to validate model performance.
  - All models need to be verified and validated for the specific application in which they are to be used in accordance with the guidance provided in Section "Model Substantiation," below.
- **Sensitivity**
  - Describe the efforts to evaluate the impact of model and input parameter uncertainty on the model predicted outcomes.
  - Describe the efforts to evaluate the propagation of uncertainty into downstream models.

One approach to fulfill these requirements is to provide the following documents to demonstrate the substantiation of each model:

- **Technical documentation** according to ASTM E 1472 – Standard Guide for Documenting Computer Software for Fire Models. Include a listing of assumptions and known limitations of the model according to ASTM E 1895 – Standard Guide for Determining Uses and Limitations of Deterministic Fire Models.

- **Verification and validation documentation** according to the SFPE's Guidelines for Substantiating a Fire Model for a Given Application or ASTM E 1355 – Standard Guide for Evaluating the Predicting Capability of Deterministic Fire Models.

In lieu of providing customized documentation, the electrical corporation may provide a copy of documentation generated by a commercial provider of a model or an open-source project if all the following conditions are met:

- The specific version documentation of the model and any underlying data in use by the electrical corporation are the same.
- Any custom modifications to the model by the electrical corporation have been integrated into the model documentation and are available in the same format as the model (i.e., custom modules to an open-source project must be open source and integrated into the project).
- The electrical corporation lists and justifies the options used within the model for its application, including all non-default features or assumptions.

Model Substantiation

Model substantiation is the process used to ensure that a model is correct and suitable to an application. The following relevant terms are defined in Appendix A "Definitions:"

- **Calibration**
- **Model uncertainty**
- **Parameter uncertainty**
- **Sensitivity**
- **Uncertainty**
- **Validation**
- **Verification**

For each model, the electrical corporation must be readily able to provide, if requested by Energy Safety or designated stakeholders, documentation of the following model substantiation studies:

- **Validation data** – Identify existing data that can be used to validate model performance.

- **Model verification** – Describe efforts to verify that the model is working as designed and that the equations are being properly solved. Verification is often conducted through independent review of source code and use of unit and integration test suites by the software developer. If the end user of a model is not the same as the model developers, the SFPE guidance includes an additional step on user training and certification to the verification process. The verification study of each model must include each of the following:
    - Verification of the basic functionality of the model through simple test cases.
    - Verification of consistency of input parameters. For example, wind speed varies substantially as a function of height and space. Individual wildfire models may assume wind speed is specified at a fixed height (such as 20 feet, 32 feet, or mid-flame height). Specifying the wind speed at the wrong height may result in incorrect model predictions.
    - Independent review, which may consist of one of the following:
    - Independent third-party review of software implementation and data integration where the third-party is neither an employee nor a subcontractor of the electrical corporation or software supplier.
    - Software verification suite, including software source code and automated verification code, provided by the electrical corporation to Energy Safety. See the Fire Dynamics Suite (FDS) developed by NIST for an example.[13]
- **Model validation** – Models are validated by comparing model predictions to observations from historic events or experiments. It is important to note that validation does not mean that a model's predictions are perfect. Rather, the predictions are good enough for the intended use case. The validation study and uncertainty assessment of each model must do each of the following:
    - Document the efforts undertaken by the electrical corporation to quantify the uncertainty in the model when input parameters are known (i.e., open calculation). This should include a discussion of relevant experiments/datasets

[13] Fire Dynamics Simulator, FDS Verification Process - https://github.com/firemodels/fds/wiki/FDS-Verification-Process.

used to benchmark performance as well as a statistical summary of performance. See the FDS validation suite developed by NIST.[14]

- Document the efforts undertaken by the electrical corporation to quantify the variability in input parameters in practice. This should include a discussion of the input data currently used in the model, the process used to update these data, the sensitivity of model predictions to this variability, and the degree to which this variability is within the validation range presented for the software model.
- Document the type of model validation based on the characterizations defined in ASTM E 1355 (i.e., blind calculation, specified calculation, open calculation).
- Open calculations consist of modeling efforts where the expected model output and input parameters are based on post-event knowledge. This is a reasonable approach for risk assessment where there is time to gather and process these data. However, the accuracy of a model in open calculation may not directly translate to accuracy in other calculation classes.
- The predictive power of the model to generate forecasts of ongoing events is best captured through blind validation due to the impact of uncertainties in model inputs. For example, in forecasting the spread of a wildfire, there is high uncertainty in vegetation and weather conditions. The focus of blind validation is to understand how accurate the forecasts are when the inputs include uncertainty.

- **Model calibration** – Calibration in the context of wildfire risk assessment is focused on modifying model inputs and model parameters to achieve better agreement for a specific scenario. Calibration is an important process to develop validation scenarios as well as to support real-time decision making. In general, calibration approaches limit the propagation of error by correcting to new data but have limited effectiveness in improving the quality of the forecast. However, calibrating the model to each individual scenario does not provide confidence in the predictive capability of the model for new scenarios. For each model that uses real-time calibration, the following must be documented:
  - Data sources used in calibrating the model

[14] Fire Dynamics Simulator, FDS Validation Process - https://github.com/firemodels/fds/wiki/FDS-Validation-Process.

- Model parameters that are modified during calibration and the process used to modify parameters
- Uncertainty as a function of lead time (i.e., forecast time) with and without calibration
- The degree to which a model predicted value might differ from the true value, including systematic bias and statistical variance (i.e., model uncertainty assessment). This should be presented in an open calculation.

Additional Models Supporting Risk Calculation

The electrical corporation must be able to provide, if requested by Energy Safety or designated stakeholders, the following information regarding additional models that support risk calculation. The electrical corporation does not need to provide this information as part of its WMP submission.

Weather Analysis

The electrical corporation must evaluate weather history within its service territory to determine realistic design scenarios. Energy Safety considers the following to be key elements in the calculation of the weather history:

- Inclusion of at least the following **model outputs:**
  - Air temperature
  - Barometric pressure
  - Fuel moisture
  - Relative humidity
  - Wind velocity (speed and direction)
- Evaluation of the **sensitivity** of downstream models to uncertainty in weather modeling.
- Use of **separate modules** for local weather analysis and local vegetation analysis.
- Use of **spatial granularity** of forecasts that at a minimum include:
  - Horizontal resolution ≤4 km
  - Vertical resolution sufficient to evaluate average conditions at environmental monitoring system locations

- Use of at least a 30-year **time horizon** of the weather analysis throughout the service territory.
- Calculation of the **uncertainty** of the input parameters and model assumptions, limitations, and parameterizations on the model results.

Fuel Conditions

The electrical corporation must describe how it monitors and accounts for the contribution of fuel conditions to ignition risk in its decision-making processes. The electrical corporation must track, calculate, and report the following:

- Measurement and calculation methods used for assessing fuel conditions (e.g., live and dead fuel moisture, fuel density)
- Methodology used for projecting future fuel conditions
- Calculation of any proprietary fuel condition indices (or other measures tracked)
- Thresholds used to identify extreme fuel conditions, including any factors used to modify thresholds (e.g., fuel type, topography)
- Geospatial polygons of extreme fuel conditions within the service territory as defined in the geospatial schema (GIS Data Reporting Standard, current version)
- Geospatial statistical frequency of extreme fuel conditions over the last five years throughout the service territory

Calculation of Risk and Risk Components

This section identifies the key components of a wildfire risk analysis that the electrical corporation must quantify. The electrical corporation must be readily able to provide, if requested by Energy Safety or designated stakeholders, the information described in the following subsections: Likelihood, Consequence, PSPS Consequence, and Risk.

Likelihood

The following subsections describe likelihood risk components. Each subsection includes elements which Energy Safety considers key to the calculation of the relevant risk component; these elements are intended to establish baseline evaluation and reporting for all electrical corporations. If the electrical corporation defines other key factors as important, it should report them in a similar format.

These risk components may be combinations of other fundamental risk components. The process the electrical corporation uses to combine these risk components must be documented in section 6.2.2 of its WMP. If the electrical corporation approach uses a MAVF, the electrical corporation must be able to provide justification of each parameter (e.g., limits, scaling functions, and weights) used.

Ignition Likelihood

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the likelihood of an ignition throughout its service territory. Energy Safety considers the following elements key to the calculation:

- Equipment likelihood of ignition
- Contact by vegetation likelihood of ignition
- Contact by object likelihood of ignition

Equipment Likelihood of Ignition

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the equipment likelihood of ignition throughout its service territory by equipment type. The types of equipment it may include:

- Arrestors
- Capacitors / Capacitor banks
- Circuit breakers
- Conductors
- Connection points (conductors, insulators, splices, hotline clamps, and other connectors)
- Crossarms
- Fuses
- Poles
- Splices
- Switches
- Transformers

- Tie wires

Energy Safety considers the following elements key to the calculation:

- Typical operating conditions
- Equipment-specific failure rates
- Spark generation rates from normal operation
- Age of equipment
- Presence of mitigation (i.e., covered conductors, vibration dampers)
- Protective equipment and device settings
- Time since most recent asset inspection
- Open work requests
- Local weather conditions
- Local surface vegetation conditions

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine ignition likelihood from events and include basis data used, such as past ignition events, number of risk events, description of events, and the statistical tools used as part of the analysis.

Contact from Vegetation Likelihood of Ignition

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the contact from vegetation likelihood of ignition throughout its service territory. This may include:

- Contact from vegetation grow-in
- Contact from vegetation fall-in
- Contact from vegetation blow-in

Energy Safety considers the following elements key to the calculation:

- Type of contact (i.e., grow-in, fall-in, blow-in)
- Vegetation species evaluated
- Protective equipment and device settings
- Time since most recent vegetation inspection

- Local weather conditions
- Local surface vegetation conditions

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine ignition likelihood from events and include basis data used, such as past ignition events, number of risk events, and description of events, and the statistical tools used as part of the analysis.

Contact from Object Likelihood of Ignition

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the contact from object likelihood of ignition throughout its service territory. This may include:

- Vehicle contact (pole strike)
- Balloon contact
- Animal contact
- Unknown contact

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine ignition likelihood from events, including data used, such as past ignition events, number of risk events, and description of events, and the statistical tools used as part of the analysis.

Burn Probability

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the likelihood wildfire will burn individual locations within its service territory. Energy Safety considers the following elements key to the calculation:

- Local topography (i.e., elevation, slope, aspect)
- Local weather (i.e., statistical extreme conditions based on a 30-year average and seasonal weather)
- Local vegetation (i.e., type/class/species/fuel model, canopy height/base height/cover, growth rates, and moisture content)
- Climate change impact on fuel aridity (i.e., impact in seasonal extreme moisture content)

PSPS Likelihood

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to evaluate the annual likelihood of its issuing a PSPS for a circuit segment within its service territory. Energy Safety considers the following elements key to the calculation:

- Weather (i.e., statistical extreme conditions based on a 30-year average and seasonal weather)
- Ignition risk

Consequence

The following subsections describes consequence risk components. Each subsection includes elements which Energy Safety considers key to the calculation of the relevant risk component; these elements are intended to establish baseline evaluation and reporting for all electrical corporations. If the electrical corporation identifies other key factors as important, it should report them in the WMP in a similar format.

These risk components may be the combination of other fundamental risk components. The process the electrical corporation uses to combine these risk components must be documented in section 6.2.2 of its WMP. If the electrical corporation approach uses a MAVF, the electrical corporation must provide a table in this section along with discussion and justification of each parameter (e.g., limits, scaling functions, and weights) used.

Wildfire Consequence

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the consequence of a wildfire at each location throughout its service territory. Energy Safety considers the following elements key to the calculation:

- Wildfire hazard intensity
- Wildfire exposure potential
- Wildfire vulnerability

Wildfire Hazard Intensity

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the intensity of a wildfire at a

location it reaches within the community. Energy Safety considers the following elements key to the calculation:

- Local topography (i.e., elevation, slope, aspect)
- Local weather (i.e., statistical extreme conditions based on a 30-year average and seasonal weather)
- Local vegetation (i.e., type/class/species/fuel model, canopy height/base height/cover, growth rates, and moisture content)
- Local fire behavior (e.g., heat release rate, flame length)

Wildfire Exposure Potential

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the exposure potential of a wildfire that reaches a community. Energy Safety considers the following elements key to the calculation:

- Population density
- Residential, community, and critical infrastructure
- Environmental resources
- Social or cultural assets
- Economic factors (businesses and individual livelihoods)

Wildfire Vulnerability

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the vulnerability/resilience of a community to a wildfire that reaches the community. Energy Safety considers the following elements key to the calculation:

- Vulnerable populations (AFN, LEP, elderly)
- Legacy building codes
- Community collaborative wildfire preparedness initiatives (e.g., Firewise USA)
- Availability of ingress and egress

PSPS Consequence

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the consequence of a PSPS at each location throughout its service territory. The calculation must include a combination of at least the following:

- PSPS exposure potential
- Vulnerability of community to PSPS

PSPS Exposure Potential

The electrical corporation must be able to outline the methodology used to determine the exposure potential of a PSPS at an affected location within the community. Energy Safety considers the following elements key to the calculation:

- Population density
- Residential, community, and critical infrastructure
- Social or cultural assets
- Economic factors (businesses and individual livelihoods)

Vulnerability of a Community to PSPS

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the vulnerability/resilience of a community to a PSPS that affects the community. Energy Safety considers the following elements key to the calculation:

- Vulnerable populations (e.g., AFN, LEP, elderly)
- Presence of critical infrastructure
- Presence of redundant systems (e.g., secondary power systems)

Risk

The following subsections describe ignition risk, PSPS risk, and overall utility risk. Each subsection includes elements which Energy Safety considers key to the calculation of these risk; these elements are intended to establish baseline evaluation and reporting for all electrical corporations. If the electrical corporation identifies other key factors as important, it should report them in the WMP in a similar format.

These risks are combinations of other risk components. The process the electrical corporation uses to combine these risk components must be documented in section 6.2.2 of its WMP. If the electrical corporation approach uses a MAVF, the electrical corporation must provide a table in this section along with discussion and justification of each parameter (e.g., limits, scaling functions, and weights) used.

Ignition Risk

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the ignition risk throughout its service territory. Energy Safety considers the following elements key to the calculation:

- Ignition likelihood (ignition LoRE)
- Ignition consequence (ignition CoRE)

The calculation of ignition risk should be in alignment with the most recent CPUC decision governing RAMP filings. In the 2018 S-MAP process, this is the direct multiplication of the ignition LoRE and ignition CoRE (see S-MAP, step 3, row 13).

PSPS Risk

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the PSPS risk throughout its service territory. Energy Safety considers the following elements key to the calculation:

- PSPS likelihood (PSPS LoRE)
- PSPS consequence (PSPS CoRE)

The calculation of PSPS risk should be in alignment with the most recent CPUC decision governing RAMP filings. In the 2018 S-MAP process, this is the direct multiplication of the PSPS LoRE and PSPS CoRE (see S-MAP, step 3, row 13).

Overall Utility Risk

The electrical corporation must be readily able to outline, if requested by Energy Safety or designated stakeholders, the methodology used to determine the overall utility risk throughout its service territory. Energy Safety considers the following elements key to the calculation:

- Ignition risk
- PSPS risk

The calculation of overall risk should be in alignment with the most recent CPUC decision governing RAMP filings. The 2018 S-MAP process does not explicitly cover the combination of ignition risk and PSPS risk to determine overall utility risk. However, combination through MAVFs (see step 1A) is a logical extension of the concepts presented in the settlement agreement.[15] The electrical corporation may choose an alternative approach to combine these risks; however, it must describe the process in its WMP submission.

[15] (D.) 16-08-018 Interim Decision Adopting the Multi-Attribute Approach (or Utility Equivalent Features) and Directing Electrical corporations to Take Steps Toward a More Uniform Risk Management Framework. CPUC, 2016.

Appendix C: Additional Maps

In this appendix, the electrical corporation must provide the additional maps required by the Guidelines. As stated in the General Directions, if any additional maps needed for clarity (e.g., the scale is insufficiently large to show useful detail), the electrical corporation must either provide those additional maps in this appendix or host applicable geospatial layers on a publicly accessible web viewer. If the electrical corporation chooses the latter option, it must refer to the specific web address in appropriate places throughout its WMP. Additionally, the electrical corporation must host these layers until the submission of its 2026-2028 WMP or until otherwise directed by Energy Safety. The electrical corporation may not modify these publicly available layers without cause or without notifying Energy Safety.

Below is a list of the WMP Guidelines sections which require additional maps:

Section Number	Section Title
5.3.2	Fire History
5.4.3.3	Social Vulnerability and Exposure to Electrical Corporation Wildfire Risk
6.4.1.1	Geospatial Maps of Top Risk Areas within the HFRA

Appendix D: Areas for Continued Improvement

In this appendix, the electrical corporation must provide responses to its areas for continued improvement as identified in the Decisions on the 2022 WMP Updates in the following format:

Code and Title:

Description:

Required Progress:

[Electrical Corporation] Response:

Appendix E: Referenced Regulations, Codes, and Standards

In this appendix, the electrical corporation must provide in tabulated format a list of referenced codes, regulations, and standards. An example follows.

Name of Regulation, Code, or Standard	Brief Description
Public Utilities Code section 768.6	Statute related to emergency and disaster preparedness plans
General Order 166	Standards for Operation, Reliability, and Safety During Emergencies and Disasters
California Standardized Emergency Management Systems (SEMS)	
National Incident Management System (NIMS)	
Government Code section 8593.3	