BEFORE THE PUBLIC UTILIITES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901 (2018).	R.18-10-007 (Issued October 25, 2018)

SAN DIEGO GAS & ELECTRIC COMPANY'S (U 902 E) WILDFIRE MITIGATION PLAN

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In accordance with the January 17, 2019 Ruling of Administrative Law Judge Thomas,[1] and California Senate Bill 901,[2] San Diego Gas & Electric Company (SDG&E) submits its Wildfire Mitigation Plan, which is included as Attachment A hereto.

Respectfully submitted,

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[1] *ADMINISTRATIVE LAW JUDGE'S RULING ON WILDFIRE MITIGATION PLAN TEMPLATE, AND ADDING ADDITIONAL PARTIES AS RESPONDENTS*, dated January 17, 2019.
[2] California Senate Bill 901 (SB 901), enacted in 2018, adopted new provisions of Public Utilities Code Section 8386 requiring all California electric utilities to prepare, submit and implement annual wildfire mitigation plans that describe the utilities' plans to construct, operate and maintain their electrical lines and equipment in a manner that will help minimize the risk of catastrophic wildfires caused by those electrical lines and equipment.

ATTACHMENT A

SAN DIEGO GAS & ELECTRIC COMPANY
WILDFIRE MITIGATION PLAN

San Diego Gas & Electric Company

Wildfire Mitigation Plan

February 6, 2019

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Executive Summary

The number and severity of wildfire events across the western United States has shown a marked increase in recent years. As a direct result of the hazards associated with operating an electric system in a fire-prone region, San Diego Gas & Electric Company (SDG&E or Company) has made wildfire safety, prevention, mitigation, and recovery a central tenet of its culture. Over the past decade, SDG&E's business strategies have evolved to reflect a risk-informed approach wherein wildfire is identified as the primary public safety risk. SDG&E has hardened a significant number of facilities to address the risk of wildfire in its service territory. In recognition of the vast impacts wildfire has on public safety and the environment, this Wildfire Mitigation Plan (Plan) addresses SDG&E's efforts to mitigate the risk of wildfire ignitions.

SDG&E's efforts to mitigate the risk of wildfire and enhance grid resilience began over a decade ago after San Diego experienced some of the most destructive wildfires in the county's history. Initially, this involved establishing a Company-wide fire-awareness culture and prioritizing safe work practices. SDG&E hired subject matter experts in firefighting, fire science, and meteorology who have developed and implemented programs to enhance situational awareness, which increases SDG&E's ability to monitor and understand the wildfire environment. This level of understanding led to changes in operational procedures to reduce the potential for ignitions associated with utility infrastructure during periods of elevated fire potential. SDG&E established customer and local agency outreach programs to educate customers and stakeholders on the wildfire risk and maintain open lines of communication during hazardous conditions.

Additionally, SDG&E continues to focus on hardening its electric transmission and distribution systems, particularly in rural areas where vegetation, weather conditions, and topography often align to increase the potential for catastrophic wildfire growth (i.e., the high fire threat district). Infrastructure hardening projects have targeted high-risk fire areas to increase electric system resiliency and reduce wildfire ignition potential. SDG&E's vegetation management program also mitigates wildfire risk and supports electric system resiliency by maintaining proper tree and brush clearances to minimize vegetation-related impacts.

With the increasing impacts from climate change, community growth, and other societal forces, SDG&E's wildfire risk mitigation strategy will continue to evolve. Plans to expand system hardening projects and incorporate additional wildfire mitigation activities into SDG&E's resilience practices have been included in its pending General Rate Case (GRC) in an effort to best position the Company to achieve its goal to mitigate wildfire risk.

1 Objectives of the Wildfire Mitigation Plan

1.1 Plan Purpose

The purpose of this Plan is to provide, in accordance with state law, a plan for wildfire[1] mitigation that will be reviewed and approved by the California Public Utilities Commission (CPUC or Commission) after consultation and review by state fire experts at the California Department of Forestry and Fire Protection (CalFire). Once approved, SDG&E will utilize this Plan as a framework to reasonably manage wildfire risk until the CPUC approves a subsequent Plan (on an approximately annual basis). SDG&E anticipates that this initial Plan cycle will last 18 months, with subsequent Plans on a calendar year period.[2] SDG&E's Plan and its implementation need to be flexible to adapt to changing circumstances, weather, funding, and other variables that cannot be known in advance.

This Plan complies with P.U. Code § 8386(c), as modified by Senate Bill (SB) 901,[3] and the Administrative Law Judge's Ruling issued on January 17, 2019.[4] Table 1 below sets forth the SB 901 required elements for wildfire mitigation plans and identifies the location in this Plan where each requirement is provided.

Table 1: Plan Compliance with P.U. Code § 8386(c)

Information Required by P.U. Code § 8386(c)	Location(s) of Required Information in Plan
(1) An accounting of the responsibilities of persons responsible for executing the Plan.	Section 6.1
(2) The objectives of the Plan.	Section 1.2
(3) A description of the preventive strategies and programs to be adopted by SDG&E to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risk.	Section 2; Section 4
(4) A description of the metrics SDG&E plans to use to evaluate the Plan's performance and the assumptions that underlie the use of those metrics.	Section 6.2
(5) A discussion of how the application of previously identified metrics to previous plan performances has informed the Plan.	Section 6.3

[1] A wildfire is a large, destructive fire that spreads quickly over woodland or brush.

[2] Per California Public Utilities Code (P.U. Code) § 8386(e), the CPUC shall approve this Plan within three months of its submission, unless the CPUC determines that the three-month deadline cannot be met and issues an order extending the deadline. Considering this timing, SDG&E expects this Plan will cover the time period from when the CPUC approves the Plan through December 2020.

[3] Stats. 2018, Ch. 626.

[4] R.18-10-007, *Administrative Law Judge's Ruling on Wildfire Mitigation Plan Template, and Adding Additional Parties as Respondents* (January 17, 2019) (ALJ Ruling).

Information Required by P.U. Code § 8386(c)	Location(s) of Required Information in Plan
(6) Protocols for disabling reclosers and deenergizing portions of the electrical distribution system that consider the associated impacts on public safety, as well as protocols related to mitigating the public safety impacts of those protocols, including impacts on critical first responders and on health and communication infrastructure.	Section 4.1.2; Section 4.7
(7) Appropriate and feasible procedures for notifying a customer who may be impacted by the deenergizing of electrical lines.	Section 4.7.3
(8) Plans for vegetation management.	Section 4.4
(9) Plans for inspections of SDG&E's electrical infrastructure.	Section 4.2
(10) A list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks, throughout the electrical corporation's service territory, including all relevant wildfire risk and risk mitigation information that is part of Safety Model Assessment Proceeding and Risk Assessment Mitigation Phase filings.	Section 3.3
(11) A description of how the Plan accounts for the wildfire risk identified in SDG&E's Risk Assessment Mitigation Phase filing.	Section 3.4
(12) A description of the actions SDG&E will take to ensure its system will achieve the highest level of safety, reliability, and resiliency, and to ensure that its system is prepared for a major event, including hardening and modernizing its infrastructure with improved engineering, system design, standards, equipment, and facilities, such as undergrounding, insulation of distribution wires, and pole replacement.	Section 4.3
(13) A showing that SDG&E has an adequate sized and trained workforce to promptly restore service after a major event, taking into account employees of other utilities pursuant to mutual aid agreements and employees of entities that have entered into contracts with SDG&E.	Section 5.2.3
(14) Identification of any geographic area in SDG&E's service territory that is a higher wildfire threat than is currently identified in a CPUC fire threat map, and where the CPUC should consider expanding the high fire threat district based on new information or changes in the environment.	Section 3.4

Information Required by P.U. Code § 8386(c)	Location(s) of Required Information in Plan
(15) A methodology for identifying and presenting enterprise-wide safety risk and wildfire-related risk that is consistent with the methodology used by other electrical corporations.	Section 3.2
(16) A description of how the Plan is consistent with SDG&E's disaster and emergency preparedness plan prepared pursuant to P.U. Code § 768.6	Section 5.2
(17) A statement of how SDG&E will restore service after a wildfire.	Section 5.2
(18) Protocols for compliance with requirements adopted by the CPUC regarding activities to support customers during and after a wildfire, outage reporting, support for low-income customers, billing adjustments, deposit waivers, extended payment plans, suspension of disconnection and nonpayment fees, repair processing and timing, access to utility representatives, and emergency communications.	Section 5.3.1
(19) A description of the processes and procedures SDG&E will use to monitor and audit the implementation of the Plan, identify any deficiencies in the Plan, and monitor and audit the effectiveness of electrical line and equipment inspections.	Section 6.4

In addition to complying with state law, this Plan also complies with the ALJ Ruling in that it is organized according to the SB 901 wildfire mitigation template and includes the following additional elements:

- Plans for wildfire mitigation on transmission infrastructure, in addition to infrastructure for distribution of electricity;[5]
- Cost estimates for each item in the [wildfire mitigation plan] in order for the Commission to weigh the potential cost implications of measures proposed in the plans;[6]
- Description of planned wildfire mitigation that exceeds existing requirements, either because of "known local conditions" that exceed those standards or other reasons;[7]
- Comparison of current WMP to prior fire prevention plans, so it is clear what new strategies the utility intends to implement,[8] and

[5] This is incorporated throughout this Plan.
[6] Costs are discussed in Section 7.1 and cost estimates are provided in Appendix A.
[7] *See* Appendix A.
[8] *See* Section 7.2.

- A table entitled "§8386(c)(3)(4)(8)(9): Wildfire Mitigation Strategies and Programs," with the additional column for categories added.[9]

1.2 Plan Objectives

Consistent with state law and objectives, this Plan is founded upon the goal of minimizing the probability that the various components of SDG&E's electric system might become the original or contributing source of ignition for a wildfire. Wildfire safety, prevention, mitigation, and recovery are a central priority for SDG&E. The programs, initiatives, and plans described in this Plan highlight many of the efforts SDG&E has made and will continue to make to mitigate wildfire risk. Building upon its existing Fire Prevention Plan (FPP),[10] SDG&E further examined various improvements and further enhancements that could be made to its Community Fire Safety Program[11] to meet its and the state's wildfire mitigation objectives. While many of SDG&E's strategies and programs are already in place, this Plan is continually evolving and in an effort for continuous improvement, SDG&E expects that additional programs and enhancements will be implemented and refined.

The threat of wildfire has increased throughout California and the region over the past several years, which as discussed in greater detail herein, may be attributed to a variety of factors such as drought, climate change, bark beetle infestations, and development and population growth in fire-prone areas. Over the past ten years, SDG&E has taken significant steps to address wildfire risks and continues to evaluate opportunities to mitigate the risk. To that end, SDG&E has proposed several wildfire risk mitigation programs and activities in its Test Year (TY) 2019 GRC application, which is still awaiting Commission action.[12] Given that devasting wildfires have become a regular occurrence in California, SDG&E needs to begin implementing and accelerating programs that address wildfire risk.

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[9] *See* Appendix B. As directed by the ALJ Ruling (at 3), to the extent SDG&E has the information in its possession in time for this Plan filing, it is included.

[10] Pursuant to Commission General Order (GO) 166, electric utilities are required to have a fire prevention plan that describes the measures the electric utility intends to implement, both in the short run and in the long run, to mitigate the threat of powerline fire ignitions. SDG&E's FPP is filed annually with the CPUC on October 31. In 2016, the California Legislature passed SB 1028, which required electric utilities to annually prepare and submit a wildfire mitigation plan for CPUC review. Since SDG&E was required to submit an FPP and an SB 1028 wildfire mitigation plan, it filed one plan that met both sets of requirements. SDG&E's current FPP is available here: https://www.sdge.com/sites/default/files/documents/SDGE_Fire_Prevention_Plan_2018.pdf

[11] SDG&E's Community Fire Safety Program is an effort that not only examines the electric system to provide prudent means of delivering power to customers, but also involves working with representatives from approximately 40 different groups, including water districts, schools, the County of San Diego, fire agencies, telecommunications companies, disability rights groups, and residents, to establish and maintain appropriate communication measures in the event that an emergency situation arises.

[12] Application (A.) 17-10-007.

2 Preventive Strategies and Programs

SDG&E's approach to minimizing the risk of its electrical infrastructure causing catastrophic wildfires involves a three-pronged approach, integrating efforts in:

- **Operations and Engineering** – how SDG&E builds and maintains its electric system to be fire hardened;
- **Situational Awareness and Weather Technology** – focuses on SDG&E's ability to monitor and understand the fire environment; and
- **Customer Outreach and Education** – concentrates on communication and collaboration with regional stakeholders and customers.

SDG&E's wildfire mitigation strategy involves processes and programs to understand wildfire risk, conditions, and behaviors to provide the Company and its customers with time and information to take appropriate action; build, construct, and operate a fire-hardened electric distribution and transmission system in a manner that minimizes the possibility of igniting a fire; educate customers and stakeholders on wildfire risk; and support customers affected by outages.

The following sections provide a high-level overview of SDG&E's planned wildfire prevention strategies and programs for the next 18 months, or until the CPUC approves a subsequent Plan.[13] These preventative strategies and programs are summarized in Sections 2.1 through 2.3 and discussed in greater detail in Sections 4 and 5.

2.1 Operations and Engineering

Operating an electric system includes an element of risk. SDG&E designs and implements preventative strategies, in the way in which it constructs and operates its electric transmission and distribution system, to mitigate risks, including wildfire risk associated with those facilities. These efforts include implementing special operating plans based on wildfire conditions, inspecting and maintaining system infrastructure, managing vegetation that could impact the safe and reliable operation of the system, and hardening efforts to improve the resiliency of the system.

SDG&E has established four Operating Conditions (i.e., Normal, Elevated, Extreme, and Red Flag Warning (RFW)) to monitor the wildfire potential throughout its service territory in order to guide and inform operating decisions related to recloser settings, testing procedures, work restrictions, and sensitive relay settings. Depending on the severity of the Operating Conditions

[13] The Commission has long recognized the necessity of utilities being afforded the appropriate flexibility to use management discretion to assess and respond to emergent risks and needs as they arise. Because wildfire risk is affected by climate change and local conditions, and because many of the programs and activities described in this Plan are in their early stages of development and deployment, such flexibility is especially important in this context. If such circumstances arise, SDG&E will make changes, as appropriate, to its wildfire mitigation efforts consistent with the Commission's expectation that utilities will exercise operational discretion and flexibility to maintain safe, reliable, and resilient service for their customers, and will inform the Commission should such necessary potential changes significantly deviate from this Plan.

relative to the wildfire potential, SDG&E could choose to implement certain operating protocols for its recloser and sensitive relay settings.

SDG&E also uses its established Operating Conditions to guide and inform its maintenance activities designed to minimize the possibility of its electrical system becoming the source of ignition. SDG&E has an obligation to serve and sometimes must perform work in dangerous conditions. As conditions increase in severity, work activities can still be performed, but additional mitigation requirements might be needed, and in some situations, work activity could be ceased altogether for safety reasons. During Extreme or RFW Operating Conditions, most overhead work will cease.[14]

SDG&E employs additional fire prevention and mitigation resources, depending on the Operating Condition. SDG&E will integrate contracted fire resources with construction and maintenance crews to provide onsite fire prevention, ignition mitigation, and emergency services. SDG&E also has a contracted, full-time Industrial Fire Brigade (IFB), which are specially trained resources in electrical and flammable liquids fires and are made available to external fire agencies.

In addition to operating and work restriction protocols, SDG&E proactively maintains its electric system through its inspection and maintenance efforts. SDG&E regularly inspects the condition of its electric infrastructure and established a specific program focused on Tier 2 and Tier 3 of its High Fire Threat District (HFTD).[15] SDG&E conducts additional inspections, which are above required standards, when extreme conditions are forecasted. SDG&E also maintains its vegetation management program to keep trees and brush clear of electric powerlines and poles.

Finally, SDG&E invests in fire-hardening its electric system through various programs, which aim to strengthen and modernize the electrical system to improve the ability to meet wildfire prevention and mitigation goals. These programs include design and construction, redesign efforts, and infrastructure replacement.

These Operations and Engineering programs are discussed in greater detail in Sections 4.1 through 4.4, below.

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[14] In very rare circumstances, it is possible that not doing repair work on powerlines creates a higher risk than performing the work. In these cases, SDG&E will take additional steps to mitigate the potential of a fire.

[15] The CPUC led the development of a statewide fire threat map to designate areas where there is an elevated risk for powerline fires, and where enhanced fire safety regulations would apply. The CPUC fire map, which depicts the HFTD is available here: https://ia.cpuc.ca.gov/firemap/. These high fire threat areas are referred to the HFTD. Tier 2 fire threat areas depict areas where there is an elevated risk (including likelihood and potential impacts on people and property) from utility associated wildfires. Tier 3 fire threat areas depict areas where there is an extreme risk (including likelihood and potential impacts on people and property) from utility associated wildfires. SDG&E implemented the HFTD as required by Commission Decision (D.) 17-12-024. Tiers 2 and 3 of the HFTD are roughly analogous to and replace SDG&E's Fire Threat Zone (FTZ) and High Fire Threat Area (HFRA), respectively.

2.2 Situational Awareness and Weather Technology

SDG&E has developed a situational awareness and weather technology program, devoting time and resources to adapt the Company's operations, emergency preparedness, emergency response, and risk mitigation efforts to the changing climate conditions across its service territory. To support SDG&E's situational awareness and weather technology program, the Company:

- Deployed over 175 weather stations across its service territory to closely monitor fire weather conditions impacting electric infrastructure;
- Own or utilize, in cooperation with the University of California San Diego (UCSD), over 100 cameras to enhance situational awareness around wildfire;
- Shared weather data with external weather agencies, fire agencies, the general public, and academia;
- Utilize high-performance supercomputing clusters to integrate weather data with operational activities and systems (Santa Ana Wildfire Threat Index (SAWTI), Fire Potential Index (FPI), and the Wildfire Risk Reduction Model Operational System (WRRM-Ops));
- Developed models to determine the potential of wildfires and to understand wildfire growth patterns. The FPI effectively communicates wildfire potential within each of SDG&E's districts; WRRM-Ops integrates the latest weather and geographic information system (GIS) technology to understand wildfire growth patterns across the region);
- Strengthened its focus on wildfire preparedness by creating a Fire Science and Climate Adaptation business organization, which consists of meteorologists, community resiliency experts, fire coordinators, and project management personnel.

Moving forward, SDG&E intends to rely on its situational awareness and meteorological technologies to support proactive and real time operational practices with the objective of reducing the likelihood that its electric facilities and operations will be the source of ignition for a wildfire.

Furthermore, through ongoing data sharing and collaboration with external agencies, SDG&E's objective is to innovate and invest in technology that will decrease the risk of catastrophic wildfire fueled by high winds. Situational awareness and weather technology is discussed in further detail in Sections 4.5 and 4.6, below.

2.3 Customer Outreach and Education

SDG&E does not operate alone in mitigating wildfires; customers, elected officials, non-profit support organizations, and first responders all play a vital role in achieving wildfire prevention and mitigation. SDG&E has built and maintains a multi-level outreach and education strategy to create public awareness of fire threats, fire prevention, and support during a wildfire or de-energizing event.

SDG&E works with community leaders, government agencies, and the public to collaboratively discuss fire-safety processes regarding public safety. These collaborations provide a forum for public education as well as an opportunity to exchange improvement ideas and practices. In

addition to collaborations with the community and the public, SDG&E partners with nearly 100 non-profit organizations, such as first responder associations, councils, and fire departments to coordinate, train, and support preparedness and response activities.

SDG&E also maintains a website devoted to electric, gas, wildfire, and tree safety, as well as public safety power shutoffs, emergency preparedness, and outages.[16] SDG&E uses additional channels of communication to provide education and information materials through brochures, pocket-cards, radio and print media, mobile phones, and social media through Facebook and Twitter.

During an extreme weather event, SDG&E provides additional customer and outreach support through a targeted communication strategy. SDG&E informs its customers of expected severe weather conditions and directly notifies affected customers, either through established points of contact or through phone and text of the potential of a Public Safety Power Shutoff (PSPS). In areas most at-risk, SDG&E has established Community Resource Centers (CRCs) that are designed to provide information and aid to affected customers through a collaboration of SDG&E and volunteer organizations. CRCs are places residents can go to get water and snacks, charge their phones, and obtain up-to-date information on outages. A map and further information on CRCs may be found on SDG&E's website.[17]

The details of SDG&E's Customer Outreach and Education programs are provided in Sections 4.7 and 5, below.

3 Risk Analysis and Risk Drivers

3.1 Risk Overview

Consistent with P.U. Code § 8386(a), SDG&E constructs, maintains, and operates its system in a manner that is designed to mitigate the risk of catastrophic wildfire posed by electric infrastructure. As part of this risk-informed approach, SDG&E utilizes its risk framework, modeled after risk management standard ISO 31000.[18] This framework consists of an enterprise risk management governance structure, which addresses the roles of employees at various levels ranging up to SDG&E's Board of Directors, as well as various risk processes and tools.

One such process is SDG&E's six-step enterprise risk management process. This six-step process is aligned with the Cycla Corporation's 10-Step Evaluation Method, which was adopted by the Commission "as a common yardstick for evaluating maturity, robustness, and thoroughness of utility Risk Assessment and Mitigation Models and risk management frameworks."[19]

The enterprise risk management process is both a "bottoms-up" and "top-down" approach. It takes input from the risk managers and the risk owners to ultimately finalize SDG&E's

[16] https://www.sdge.com/wildfire-safety.
[17] https://www.sdge.com/wildfire-safety/community-resource-centers.
[18] ISO 31000 is a family of standards relating to risk management codified by the International Organization for Standardization.
[19] D.16-08-018 at 195, Ordering Paragraph 4.

enterprise risk registry (Risk Registry). The Commission defines a Risk Registry as "[a]n inventory of enterprise risks at a snapshot in time that summarizes (for a utility's management and/or stakeholders such as the CPUC) risks that a utility may face. The [Risk Registry] must be refreshed on a regular basis and can reflect the changing nature of a risk; for example, risks that were consolidated together may be separated, new risks may be added, and the level of risks may change over time."[20]

SDG&E's identified enterprise-level risks, including safety-related and wildfire-related risks, are presented in its Risk Registry. Each risk has one or more risk owner(s), a member of the senior management team who is ultimately responsible and accountable for the risk, and one or more risk manager(s), who is responsible for ongoing risk assessments and overseeing implementation of risk plans. Each risk in the Risk Registry has an associated set of mitigations (i.e., projects or programs that reduce the likelihood of the risk and/or negative consequences should the risk occur). Notwithstanding these risk management and mitigation efforts, however, adverse events will occur. When that happens, SDG&E's efforts, including implementation of response plans, development of role and responsibility descriptions and checklists, and facilitation of training and exercises, are designed to prepare the Company to respond safely and effectively to those adverse events that occurred despite mitigation efforts.

The six steps of SDG&E's risk management process are shown in Figure 1 below and discussed in further detail in the following sections. SDG&E's approach is consistent with the CPUC's guidance on risk management.

Figure 1: Risk Management Process

[20] D.18-12-014 at 16-17.

3.1.1 Risk Identification

Step 1 of SDG&E's risk management process is risk identification, which as defined by ISO 31000, is the process of finding, recognizing, and describing risks. It includes the identification of risk sources, events, their causes and potential consequences. To begin SDG&E's six-step process, the Enterprise Risk Management (ERM) organization annually reaches out to the various business units across the Company to update existing risk information and identify enterprise-level risks that emerged since the prior assessment. This is completed through interviews and meetings with risk owners and managers.

3.1.2 Risk Analysis

Risk analysis, as defined by ISO 31000, is the process to comprehend the nature of risk and to determine the level of risk. This is Step 2 in SDG&E's risk management process and it provides a basis for risk evaluation and decisions about risk mitigation. SDG&E uses a tool for risk analysis referred to as the risk "bow tie," which is depicted in Figure 2 below. The risk bow tie "consists of the Risk Event in the center, a listing of drivers on the left side that potentially lead to the Risk Event occurring, and a listing of Consequences on the right side that show the potential outcomes if the Risk Event occurs."[21] A driver, also referred to as trigger, is a "factor that could influence the likelihood of occurrence of a Risk Event. A driver may include external events or characteristics inherent to the asset or system."[22] It is critical to note that a risk driver (or trigger) is an indication that a risk event could occur. It does not reflect actual conditions or threatened conditions. Typically, mitigations address various drivers of a given risk. SDG&E performs a bow tie analysis to summarize the risk information.

SDG&E's risk analysis results in a risk score. A risk score is a "[n]umerical representation of qualitative and/or quantitative risk assessment that is typically used to relatively rank risks and may change over time."[23]

As stated in ISO 31000, risk analysis is undertaken with varying degrees of details depending on the risk and the availability of data and resources. SDG&E utilizes a combination of qualitative and quantitative analyses to analyze their risks. Further, for purposes of future Risk Assessment Mitigation Phase (RAMP) and GRC filings, SDG&E, along with the other California investor-owned utilities (IOUs), will employ the risk management processes and methods set forth in D.18-12-014.

3.1.3 Risk Evaluation and Prioritization

Step 3 in SDG&E's risk management process is risk evaluation, which is the process of comparing the results of risk analysis. As stated above, SDG&E's methodology for conducting risk evaluation in future RAMP proceedings will be based on D.18-12-014. SDG&E leverages the information from its risk assessment and evaluation to develop its prioritization. On an annual basis, the ERM organization facilitates a risk prioritization session where risk owners discuss the relative ranking of the enterprise risks and achieve consensus around risk priorities.

[21] D.18-12-014 at 16.
[22] D.18-12-014 at 16.
[23] D.18-12-014 at 18.

3.1.4 Risk Mitigation Plan Development and Documentation

Based on the analysis and evaluation of risks, Step 4 of SDG&E's risk management process involves developing and documenting risk mitigation plans by risk owners and managers to capture the state of the risk given current controls and any proposed additional mitigations.[24] The risk owners then present their key risk mitigation plans to SDG&E's senior management team and discuss the feasibility and prudency of those proposed plans.

3.1.5 Risk-Informed Investment Decisions and Risk Mitigation Implementation

Steps 1 through 4 of SDG&E's risk management process are inputs into Step 5, the Company's investment planning process. The investment planning process is SDG&E's current process for prioritizing funding based on risk-informed priorities and input from operations. At least one member of the ERM organization participates in this process, together with many of the risk owners and risk managers, to align the efforts undertaken on the risk front with decisions made from an operational and financial perspective.

3.1.6 Monitoring and Review

SDG&E strives for continuous improvements of its enterprise risk management process. In Step 6 of its risk management process, SDG&E monitors various mitigation efforts through indicators[25] and periodically commissions third-party maturity assessments.

3.1.7 Methodological Advances

The Commission has adopted "minimum required elements for risk and mitigation analysis in the [RAMP] and [GRC]."[26] These minimum required elements include: building a Multi Attribute Value Function (MAVF); identifying risks for the IOUs' respective Risk Registries; risk assessment and risk ranking in preparation for RAMP; selecting enterprise risks for RAMP; and mitigation analysis for risks in RAMP.

These new minimum required elements are largely methodological in nature, and the Commission has noted that these risk tools represent "a big improvement" by "dramatically advanc[ing] the utility's ability to assess and prioritize risks."[27] The new methodology "achieves steps toward a more uniform and quantitative risk-based decisionmaking framework"[28] amongst the large California IOUs. SDG&E plans to reflect this new methodology in its upcoming RAMP filing, which is currently scheduled for November 2019.

[24] A Control is defined as "Currently established measure that is modifying risk." A Mitigation is defined as "Measure or activity proposed or in process designed to reduce the impact/consequences and/or likelihood/probability of an event." *See* D.18-12-014 at 16-17.
[25] D.18-12-014 at 26.
[26] D.18-12-014 at 2.
[27] D.18-12-014 at 44.
[28] D.18-12-014 at 2.

3.1.8 SDG&E's Risk Assessment Mitigation Phase Report

The Risk Assessment Mitigation Phase is a procedural requirement established by the Commission and is considered to be "an initial phase of each utility's GRC proceeding."[29] The purpose of RAMP is "to examine the utility's assessment of its key risks and its proposed programs for mitigating those risks."[30] SDG&E (concurrently with Southern California Gas Company) was the first utility to file a RAMP Report (2016 RAMP Report).[31]

To determine which risks should be included in its 2016 RAMP, SDG&E utilized the risk assessment from its 2015 Risk Registry. The 2015 Risk Registry, completed in September 2015, was used as the basis for identifying the RAMP risks, because it was the most current risk registry available at the time that SDG&E was preparing its 2016 RAMP Report.

SDG&E's 2015 Risk Registry used a 7x7 Risk Evaluation Framework (REF), also referred to as the 7x7 matrix, to evaluate the level of risks and differentiate risks from one another by gauging their frequency of occurrence against their potential impact. In the REF, risk scores are calculated from two inputs: impact and frequency. The impact, or consequence, is the "effect of the occurrence of a Risk Event."[32] The frequency is the "number of events generally defined per unit of time."[33] Both the impact and frequency inputs are measured on a scale from one to seven.

The REF considers several attributes when measuring impact, including the attribute called "Health, Safety, and Environmental Impact." SDG&E included risks in its RAMP that had an impact score of four or higher for the Health, Safety, and Environmental attribute, based on the 2015 Risk Registry. This selection criteria was based on discussions with the Commission's Safety and Enforcement Division (SED) and with stakeholders during a workshop in the Safety Model Assessment Proceeding (S-MAP) and memorialized in D.16-08-018 (for SoCalGas and SDG&E only). The 7x7 matrix defined a score of four in the Health, Safety, and Environmental impact category as "Permanent/Serious Injuries or Illnesses: Few serious injuries or illnesses to the public or employees. Significant and short-term impacts to environment."

Using the selection criteria above, SDG&E's 2016 RAMP Report consisted of 17 of the Company's key safety risks and plans for mitigating those risks. Each of the 17 risks had a dedicated risk chapter in the 2016 RAMP Report. Wildfire-related risks were presented as risk chapters in SDG&E's 2016 RAMP.

[29] D.14-12-025 at 31.
[30] D.14-12-025 at 31.
[31] In accordance with D.14-12-025 and D.16-08-018, the 2016 RAMP Report was filed on November 30, 2016 in proceeding Investigation (I.) 16-10-015.
[32] D.18-12-014 at 16.
[33] D.18-12-014 at 17.

3.2 Wildfire Risks – Prioritization and Drivers

SDG&E has a separate and distinct risk in its Risk Registry dedicated to the risk of catastrophic wildfires (Wildfire Risk). In the Wildfire Risk, the event[34] itself (i.e., the center of the bow tie) is a wildfire. As discussed in SDG&E's 2016 RAMP, the description of this risk is an uncontrollable fire possibly consuming structures caused by failure of SDG&E equipment, vegetation contact with SDG&E equipment, foreign object contact with SDG&E equipment, failure of third-party equipment attached to SDG&E assets, and/or slow response and inadequate awareness due to lack of coordination with other agencies.

The threat of wildfire has increased throughout California over the past several years, which in turn causes the Wildfire Risk to be the number one risk in SDG&E's risk register. This increased threat is due to a variety of factors including drought, climate change, bark beetle infestations, and population growth into fire-prone areas. Environmental conditions such as dried fuels (e.g., chaparral) and severe wind events can turn a wildfire that might otherwise be quickly contained by firefighting resources into a wildfire. As discussed throughout this Plan, SDG&E has established programs and implemented strategies to monitor threat levels as time passes, with a focus on how to mitigate further changes that are observed.

SDG&E described its wildfire-related risks in its 2016 RAMP Report as follows below. It is important to note that the listed potential risk drivers (or triggers) are just an indication that a risk event could occur, and do not reflect actual conditions or threatened conditions:

Risk: Wildfire Caused by SDG&E Equipment, Including Third-Party Pole Attachments[35]

Potential Drivers: Include, but are not limited to, the following:

- **Downed Conductor**: A downed conductor (or "wire down") occurs when a conductor drops or breaks from its designed location on the pole and cross arm and ends up on the ground, sometimes in an energized mode. A wire down can result from a variety of factors, many of which are outside of SDG&E's control.
- **General Equipment Failure**: Electric equipment failure can be a source of a downed conductor or ignition. Failure of components such as connector, hot line clamps, and insulators can result in wire failure and end up in a wire down situation, sometimes in the energized mode.
- **Weather-Related Failure of SDG&E Equipment**: Weather plays a large part in the potential failure of SDG&E equipment. Excessive wind, lightning, and exposure to weather over time can degrade the integrity of the electrical components and lead to failure of one or more of the electrical parts causing a failure of the conductor.

[34] Risk Event is defined as "An occurrence or change of a particular set of circumstances that may have potentially adverse consequences and may require action to address. In particular, the occurrence of a Risk Event changes the levels of some or all of the Attributes of a risky situation." D.18-12-014 at 18.
[35] All wildfire issues and mitigations are included within SDG&E's Wildfire Risk. SDG&E has risks in its Risk Registry for Electric Infrastructure Integrity and Climate Change Adaptation, however, the portions of those risks that relate to wildfire issues and mitigations are accounted for within the Wildfire Risk.

- **Contact by Foreign Object**: Foreign objects coming into contact with SDG&E's facilities can also present sources of ignition. For example, Mylar balloons are highly conductive and will result in phase to phase faulting. In the worst-case this can cause the conductor to fail and land in an energized mode, causing arcing and sparking in dry conditions. In addition, vehicular contact will bring down conductors, and sometimes the entire pole, resulting in conductors laying on the ground in an energized fashion.
- **Failure of Third-Party Attachments**: As mandated by the CPUC, SDG&E must allow communication infrastructure providers to attach to utility poles when space is available. These providers may not properly install or inspect their equipment. This has led to contact of these attachments with the electrical facilities, leading to fire related incidents.
- **Vegetation Contact**: During storms and severe wind events, branches are shed by trees in the vicinity of SDG&E facilities. These can fall on conductors leading to conductor failure or, in the case of palm fronds, phase to phase contact and a cascade of sparks. In addition, trees that are many feet away from an energized conductor sometimes uproot and fall on the conductor, causing failure or sparking.
- **Not Observing Operational Procedures**: SDG&E revises its protocols and procedures based on certain conditions. For example, during red flag or fire warnings, SDG&E and its contractors may not perform welding or other activities that may generate potential ignition sources. If an employee or contractor does not adhere to such a procedure, it can cause an adverse consequence.
- **Lack of Internal or External Coordinated Response**: A well-coordinated response to a downed conductor aids in the suppression of a fire as well as the de-energization of the conductor in a safe manner. Lack of coordination could lead to uncontrolled fire, electrical exposure to first responders, and possibly, injury or death.
- **Extreme Force of Nature Events**: SDG&E's overhead electrical facilities are fully exposed to the elements. Significant weather and wind-related events can cause a variety of problems related to equipment failure and downed conductors. Also, continual exposure to natural elements can degrade or weaken key components, conditions which may not be found until the following, scheduled inspection and repair cycle.
- **Climate Change Adaptation Impacts on Wildfires Caused by SDG&E Equipment:** Despite the proactive approach to mitigating fire risk, increases in temperature and prolonged periods of drought in the decades to come will likely lead to high risk fire areas expanding from the foothills and mountains into the lower elevation coastal canyons and wildland interfaces that were previously considered at lower risk for fire growth. These prolonged periods of drought will also likely result in a longer wildfire season, potentially extending the focus of our threat monitoring and potential response from the fall months to year-round -- with the greatest increased threat in the spring and summer months.[36]

[36] SDG&E 2016 RAMP Report, Chapter SDG&E-1 at SDG&E 1-7 – 1-9.

These climate trends have already been realized across the region, culminating in previously unseen wildfire outbreaks across coastal San Diego County in May of 2014. SDG&E also employed the help of the Skycrane in San Diego on July 1, 2016 (earlier than in prior years), in response to an increase in summertime wildfire activity across the region. Based upon the most recent climate science, these trends are likely to continue and worsen into the future.[37]

Potential Consequences: If one of the risk drivers listed above were to occur, resulting in an incident, the potential consequences, in a reasonable worst-case scenario could include:[38]

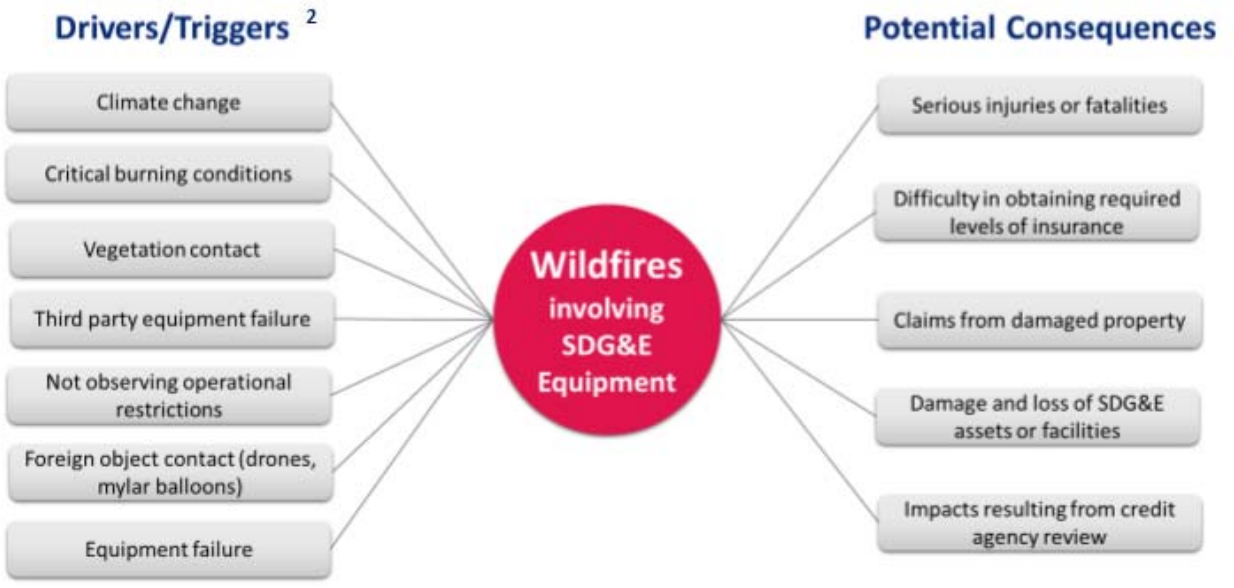
- Personal injuries to the public, employees and contractors, including numerous fatalities;
- Damage to third party real and personal property;
- Damage and loss of SDG&E assets or facilities;
- Operational and reliability impacts;
- Claims and litigation; and
- Erosion of public confidence.

SDG&E's Wildfire Risk, including its risk drivers, has evolved since its 2016 RAMP. Generally, SDG&E incorporates lessons learned from its prior Risk Registry cycles consistent with Step 6 of its risk management process, discussed in Section 3.1.8 above. In an effort to streamline the presentation of enterprise risks, in recent years the language in the Risk Registry itself has been tightened and, in some cases, generalized. That said, the risk-related information for the Wildfire Risk has not been significantly revised since SDG&E's 2016 RAMP. For example, the 2015 Risk Registry, on which SDG&E's 2016 RAMP was based, included potential drivers of "Downed Conductor in Santa Ana Conditions" and "Weather Related Failure of SDG&E Equipment." In the 2018 Risk Registry, these two potential drivers have been incorporated into the more generalized potential driver of "Equipment Failure." Further, the 2015 Risk Registry had a stand-alone potential driver of "Lack of Internal or External Coordinated Response." This is no longer a stand-alone potential driver and has now been incorporated into the potential drivers of "Equipment Failure" and "Not Observing Operational Restrictions." Similarly, while climate change-related items were discussed as potential drivers to the Wildfire Risk in the 2016 RAMP, in the 2018 Risk Registry, SDG&E has explicitly made "Climate Change" and "Critical Burning Conditions"[39] separate potential drivers given their importance and impacts to the region.

[37] SDG&E 2016 RAMP Report, Chapter SDG&E-1 at SDG&E 1-9. Since 2016, these climate trends have continued and worsened across the region, culminating in wind-driven wildfire outbreaks across San Diego County during atypical periods that include December 2017 and July 2018. In response to an increase in overall wildfire activity across the region, SDG&E now employs the Skycrane year-round.
[38] SDG&E 2016 RAMP Report, Chapter SDG&E-1 at SDG&E 1-10. It is important to note that a potential worst-case scenario, such as one used to assess residual risk impacts and frequency, may not necessarily contain all drivers or triggers.
[39] Critical Burning Conditions refer to the combination of current fuel conditions and weather on any given day that could lead to the potential of a critical fire.

Figure 2 below provides the risk bow tie, which summaries the most recent Wildfire Risk and risk driver information from SDG&E's 2018 Risk Registry:

Figure 2: Wildfire Risk Bow Tie



[2] Risk Drivers/Trigger: an indication that a risk could occur. It does not reflect actual or threatened conditions.

In accordance with the ALJ Ruling, the table below maps the potential Wildfire Risk drivers from Figure 2 to one or more of the categories of: (1) Design and Construction, (2) Inspection and Maintenance, (3) Operational Practices, (4) Situational/Conditional Awareness, and (5) Response and Recovery.

Table 2: Categorization of Wildfire Risk Drivers

Wildfire Risk Drivers	ALJ Ruling Categorization(s)
Climate Change	Situational/Conditional Awareness
Critical Burning Conditions	Situational/Conditional Awareness
Vegetation Contact	Inspection and Maintenance; Design and Construction
Third Party Equipment Failure	Inspection and Maintenance; Design and Construction
Not Observing Operational Restrictions	Operational Practices; Situational/Conditional Awareness
Foreign Object Contact (i.e., Drones, Mylar Balloons)	Response and Recovery; Design and Construction
Equipment Failure	Design and Construction; Inspection and Maintenance

3.2.1 Safety Model Assessment Proceeding

In addition to the information presented in SDG&E's 2016 RAMP Report, SDG&E described how it models and assesses wildfires in its Safety Model Assessment Proceeding (S-MAP) Application.[40] In its S-MAP proceeding, SDG&E explained its quantitative method for prioritizing wildfire-related hardening projects including the Fire Risk Mitigation (FiRM) program and the Wildfire Risk Reduction Model (WRRM). A detailed discussion of FiRM is provided in Section 4.3.9 below and the WRRM is discussed briefly here and in more detail in Section 4.5.5 below.

Due to the complexity of Wildfire Risk, SDG&E developed a sophisticated modeling tool, the WRRM, which is a computer-based model that has the ability to create probability distributions for: ignitions rates by equipment type and external causes, fire growth potentials, and values at risk. Using these probabilities, SDG&E can run simulations of wildfire risk that can be configured for all weather types, or specific weather patterns.

Since the submission of SDG&E's S-MAP Application, there have been further enhancements to the WRRM. The WRRM was used as the foundation for a separate operational version of the model known as WRRM-Ops, which is now operational to support emergency operations and performs over 10 million virtual fire behavior simulations every day. WRRM-Ops provides SDG&E additional data that is important to maintaining situational awareness. While SDG&E uses WRRM-Ops operationally, it is one data point used for planning and decision-making purposes.

3.3 RAMP Risk-Informed Wildfire Mitigation Plan

As explained in the wildfire chapter of the 2016 RAMP Report, SDG&E performs a broad range of activities related to fire prevention and mitigation. The effectiveness of several of these activities is a performance measure for many SDG&E employees, some of whom are directly or indirectly responsible for contributing to and/or performing the mitigation efforts. Core to the mitigation activities are system design, construction, operation, maintenance, and inspection aimed at reducing the potential for SDG&E facilities to become the source of ignition for a fire. Nevertheless, SDG&E has an obligation to serve, and the range of operating conditions faced in the SDG&E service territory continue to present some risk that SDG&E facilities might be associated with ignition for a fire, regardless of how diligent these practices may be.

This Plan builds upon SDG&E's 2016 RAMP and TY 2019 GRC by putting forth refinements, continuations, and enhancements to the mitigation activities presented therein. Such programs are described in greater detail in Section 4 of this Plan.

[40] *See* A.15-05-002.

3.4 Wildfire Threat Zones

SDG&E historically identified geographic boundaries that were used for wildfire projects, programs, and operations. In 2008, the CPUC initiated various proceedings that focused on the creation of new statewide fire safety maps.[41] SDG&E participated in these proceedings, which led to the development of what would become known as the HFTD map.[42] The geographic areas delineated by that map allow utilities to prioritize their efforts. The CPUC hosts a webpage specifically for communicating the purpose of the HFTD development, as well as being the official repository of the actual map data.[43]

Since the adoption of those maps by the CPUC in early 2018, SDG&E has modified relevant operational practices to be consistent with the new maps. State law requires the utilities to re-evaluate its service territory and identify areas that may pose elevated risk that are not currently identified in the CPUC's existing fire threat map, and where the CPUC should consider expanding the HFTD based on new information or changes in the environment.[44] SDG&E has considered the potential and has identified certain wildland urban interface and coastal areas that possess high amounts of native and non-native vegetation, which under certain circumstance, could contribute to a wildfire if an ignition took place under extreme weather conditions. Therefore, SDG&E intends to perform relevant assessments to determine whether these areas warrant inclusion in the HFTD.

4 Wildfire Prevention Strategy and Programs

SDG&E's wildfire prevention strategies and programs are comprised of three prongs: operations and engineering, situational awareness and weather technology, and customer education and outreach. SDG&E's strategies and programs are described in the following sections, organized in these three groups.

Consistent with the ALJ Ruling, for each identified preventative strategy or program in Section 4 of this Plan, the workpapers in Appendix A provide detailed information on: (1) whether the program/strategy is existing or new; (2) if existing, the proceeding where the program/strategy costs have been subjected to Commission review; (3) if new, identification of any memorandum account where related costs are being tracked and an explanation of how double tracking is prevented;[45] (4) whether the program/strategy is implemented in compliance with existing

[41] Commission Rulemaking (R.) 08-11-005 and R.15-05-006.
[42] *See* discussion in Section 2.1 above, in particular footnote 15.
[43] http://www.cpuc.ca.gov/firethreatmaps/
[44] P.U. Code § 8386(c)(14).
[45] SDG&E filed Advice Letter 3333-E on January 16, 2019 requesting to establish the Fire Risk Mitigation Memorandum Account (FRMMA) pursuant to P.U. Code § 8386(j). As stated in Advice Letter 3333-E, SDG&E has wildfire mitigation projects and programs pending before the CPUC in its TY 2019 GRC. If such projects and programs are approved in the TY 2019 GRC or other applicable proceedings, SDG&E will reconcile the activities recorded in the FRMMA with final CPUC decisions so that there is no overlap in cost recovery. Further, in accordance with P.U. Code § 8386(e), following approval of this Plan, SDG&E plans to establish a separate memorandum account to track costs incurred to implement the Plan. SDG&E's interpretation of the memorandum account pursuant to P.U. Code §8386(e) is that this

regulations or exceeds current regulatory requirements; (5) if a program/strategy is identified as meeting a current regulatory requirement, a citation to the associated order, rule, or code; (6) a description of how the implementation of the program/strategy mitigates one or more of the wildfire risks or drivers identified in the Plan. Additionally, each of the identified preventive strategies and programs is delineated into one of the following categories: (1) Design and Construction, (2) Inspection and Maintenance, (3) Operational Practices, (4) Situational/Conditional Awareness, and (5) Response and Recovery.

4.1 Operational and Engineering Practices

4.1.1 Operating Conditions

Using its situational awareness capabilities and a formalized escalation approach, SDG&E monitors the potential for wildfire throughout its service territory on a daily basis. As the conditions for wildfires increase, SDG&E can deploy additional layers of safeguards, or as a last resort, it might choose to shut-off power to certain areas of its service territory in the interest of public safety.

SDG&E uses a variety of situational awareness inputs to determine the appropriate operating environment given current and expected wildfire conditions. Among these inputs for situational awareness are the Fire Potential Index (FPI), Santa Ana Wildfire Threat Index (SAWTI), and field observations. These are summarized below and discussed in greater detail within Section 4.5 of this Plan.

- **Fire Potential Index:** Using its meteorological staff and over 30 years of historical weather data from the National Weather Service, local airports, and its own proprietary database, SDG&E prepares a daily detailed forecast of weather conditions relevant to SDG&E's operations. The forecasts are a combination of weather parameters and vegetation conditions and are used to create the FPI forecast. The FPI is used for operational decision-making to reduce fire threats and risks. It is developed daily and provides a rolling seven-day forecast of the potential for wildfires so that SDG&E personnel can plan and prepare.
- **Santa Ana Wildfire Threat Index:** The SAWTI is a web-based tool, developed in a public/private collaboration, that classifies the wildfire threat potential associated with the Santa Ana winds. It uses wind speed, humidity, and fuel conditions to determine the potential severity of an event in terms of its impact on the fire environment. The SAWTI is updated daily by the United States Forest Service (U.S. Forest Service) Geographic Area Coordination Center. They generate a six-day forecast of large wildfire potential, which will result in one of four classification levels from "marginal" to "extreme." The SAWTI is also used for operational decision-making to reduce wildfire threats and risks.
- **Field Observations:** SDG&E strategically positions field personnel throughout its service territory based on system conditions, weather, and wildfire potential, which may be considered a threat to SDG&E facilities. Field observers inform operational decisions by

account will track the costs incurred to implement the Plan in its entirety thus making it a tracking account for which SDG&E will not seek future cost recovery.

providing real-time input regarding onsite conditions, such as, debris, vegetation, and system status.

SDG&E established four Operating Conditions to monitor wildfire potential and among other thing, inform decisions regarding recloser settings, sensitive relay settings, testing procedures, and work restrictions. These Operating Conditions are: Normal Condition, Elevated Condition, Extreme Condition, and RFW Condition, which are summarized below and discussed in more detail in Appendix C.[46]

- **Normal Condition** is declared when it has been determined by SDG&E that the burn environment is not conducive for catastrophic wildfires within its service territory. The FPI forecast is in the range of 1 through 11.
- **Elevated Condition** is declared when SDG&E determines that the burn environment has become conducive to wildfires within its service territory. The FPI forecast is in the range of 12 to 14.
- **Extreme Condition** is declared when SDG&E determines that a combination of high winds, low relative humidity, and the burn environment will create critical wildfire weather conditions in its service territory. The FPI forecast is 15 or above, and specific areas of SDG&E's service territory have the potential for catastrophic wildfires.
- **RFW Condition** is declared by the National Weather Service when high winds and low relative humidity are forecasted to occur for an extended period. During these conditions, there is the potential for catastrophic wildfires. Depending on the weather zone impacted by the declared RFW and communicated by SDG&E's meteorological staff, various operational restrictions and procedures appropriate to each impacted operating district will be triggered and implemented.

4.1.2 Recloser Protocols[47]

SDG&E has deployed overhead distribution reclosers, with a particular focus in the HFTD. A recloser is a switching device that is designed to detect and interrupt momentary faults (i.e., a sudden undesirable significant increase in current from either external forces or equipment malfunction). The device has the ability to reclose automatically and open back up if a fault is still detected. The automated reclosing feature can be disabled, so if a device detects a fault it will trip open and remain open. These overhead distribution reclosers allow SDG&E to operate its system in a variety of configurations depending on input from its meteorologists, known localized conditions, and its declared Operating Condition. They also provide SDG&E the ability to sectionalize various elements of its distribution system to efficiently manage system operations and reliability, which results in quicker restoration times for customers. The

[46] Appendix C provides SDG&E's current chart of Operating Conditions. During drought conditions or periods of very dry weather, SDG&E may periodically operate more conservatively than noted in the Operating Conditions chart.

[47] For protocols for de-energizing portions of the electrical distribution system, refer to Section 4.7 herein.

overhead distribution reclosers and other Supervisory Control and Data Acquisition (SCADA)-controlled reclosers are managed remotely by SDG&E.

Under Normal Conditions, overhead distribution reclosers operate to clear faults by isolating the least amount of customers and reducing the overall exposure to the electric system. Under Elevated Conditions, SDG&E has seen a need to make overhead distribution reclosers operate faster and more sensitively in order to clear faults in a manner to reduce the energy of the fault as much as possible. By reducing the resultant energy of a fault, the probability of causing significant damage to the surrounding area is reduced. Because of this need, SDG&E has developed the ability to enable more sensitive relay settings on overhead distribution reclosers. These sensitive relay settings improve both the sensitivity of fault detection, and the speed at which faults are cleared. These sensitive settings can clear faults on distribution circuits up to a full second faster than normal settings, reducing fault energy up to 66%. These more sensitive settings are remotely enabled via SCADA, allowing for real-time adjustments triggered by adverse weather conditions.[48]

Along with a wide deployment of distribution overhead reclosers with sensitive setting functionality, SDG&E has also installed a subset of pulse reclosers within the HFTD that have the added functionality of reducing fault energy during reclosing operations. Pulse reclosers can operate at significantly reduced energy flows during reclosing operations, which reduces the probability of a source ignition resulting in damage to facilities and the surrounding area.

In an Elevated Condition or higher, all distribution reclosing functions are disabled on circuits located within the HFTD but may include other circuits if the burn environment is conducive to large wildfires. If needed, SDG&E may enable the sensitive relay setting for overhead distribution reclosers in areas of most adverse wildfire weather conditions.

4.1.3 Other Special Work Procedures

SDG&E has designated the type of work activity that can be performed for each of the Operating Conditions.[49] As conditions increase in severity, work activities may still be performed, but some might have additional mitigation requirements. In other situations, work activity might cease. The following summarizes the work activity guidelines for each Operating Condition.

- Normal Condition: Normal operating procedures are followed with baseline tools and equipment.
- Elevated Condition: Certain work activities may require additional mitigation measures in order to proceed with work. The additional mitigative measures will be documented.
- Extreme and RFW Conditions: Most overhead work activities will cease, except where not performing the work creates a greater risk than doing so. In those cases where work needs to be performed, an SDG&E fire coordinator is consulted, and any required

[48] A sensitive relay profile alters the settings of the isolating device to reduce the exposure of fault current by reducing the relay trip time and lowering the pick-up values, which makes the device both very fast and very sensitive, so faults will clear as quickly as possible.
[49] How these Operating Conditions are determined is explained in detail in Section 4.1.1 above.

additional mitigation steps are implemented. Status of the work, ceased or continued, will be documented.

These guidelines are generally sufficient for most routine types of activities performed in the wildland areas, which consist of undeveloped areas covered in native vegetation. For non-routine, or especially hazardous work, SDG&E's Fire Coordination group is consulted to determine if additional mitigation requirements are needed.

4.1.3.1 Project Activity Levels

The U.S. Forest Service relies on the Project Activity Level (PAL) system, which was designed to help fire and timber resource managers establish the level of industrial precaution for the following day. PAL utilizes outputs from the National Fire Danger Rating System (NFDRS) to inform decisions aimed at reducing the risk of fire on National Forest land, particularly in the timber or mountain areas, and applies to the Cleveland National Forest. Forests receive a daily announcement of the forecasted PAL for the next day, and it is an indication of any additional work restrictions or mitigation measures that will be necessary to perform work in the designated area.

4.1.4 Fire Coordination - Firefighting Assets and Resources

An important line of defense against the ignition of fires is a well-equipped, well-trained, and alert workforce. SDG&E endeavors to emphasize a culture of fire prevention within the Company. To that end, SDG&E has established programs, acquired resources, and adopted work rules and complementary training programs designed to minimize the likelihood that SDG&E's facilities or field work will be associated with the ignition of a fire.

4.1.4.1 Wildfire Infrastructure Protection Teams (Contract Fire Resources)

SDG&E contracts for wildfire prevention and ignition suppression services, Contract Fire Resources (CFRs), from mid-June through the end of November. SDG&E may extend CFR coverage into other months depending on Operating Conditions or when specific needs arise. These CFRs accompany SDG&E construction crews and other electric workers to provide site specific fire prevention and ignition mitigation during the work day. The CFRs also standby in case of crew member medical emergencies that may occur while work is being performed. During RFW events or when the FPI is "extreme," additional CFRs are deployed with electric troubleshooters in the field so that ignitions that may result from work performed by a troubleshooter can be suppressed quickly especially in high fire risk areas. A typical CFR strike team includes five engines (trucks) and a leader. The fire suppression engines that CFRs predominately use are ICS Type VI, which carries two qualified fire fighters, firefighting hose, valves, and approximately 300 gallons of water.

4.1.4.2 Aviation Firefighting Program

SDG&E has developed and implemented an effective, year-round aerial firefighting program to support the fire agencies in its service territory. SDG&E has an agreement with the County of San Diego, CalFire, and the Orange County Fire Authority for aerial firefighting. Dispatch of SDG&E's aviation firefighting assets is performed through CalFire.

As discussed in this Plan, the threat of wildfire risk throughout California and the region is ongoing and year-round. When wildfires occur north of SDG&E's service territory, there is the potential that CalFire may divert other aerial firefighting resources to emerging wildfires in other parts of the state. This can lead to reduced aerial firefighting capability in the San Diego region. Currently, SDG&E has a lease for year-round use of an Aircrane firefighting helitanker. To further mitigate the threat of a year-round wildfire risk, SDG&E plans to enter into a one-year lease for an additional firefighting helitanker, a Sikorsky S-60, which unlike the Aircrane, has night fly capability.

4.1.4.3 Industrial Fire Brigade

SDG&E has contracted a full-time Industrial Fire Brigade (IFB), which is available 24-hours a day, year-round. The IFB differs from the CFRs in that, the IFB is specially trained in fighting fires involving electrical equipment (in particular substations and large transformers) as well as flammable liquids. The IFB members are housed in facilities located near the geographical center of the SDG&E service territory and are fully equipped to handle utility-related fire emergencies.

The IFB incorporates a portable fire-suppression trailer equipped with 300 gallons of Class B alcohol resistant firefighting foam, 500 pounds of chemical extinguishing agent, a 500 gallon-per-minute monitor, and hoses designed to work with hydrants or other fire apparatus. SDG&E also provides three additional trailers to strategic fire agencies that are proximate to key SDG&E facilities.

The IFB is also responsible for the development of comprehensive pre-emergency response plans for each SDG&E facility. These plans are developed for SDG&E's high-value assets first, including SDG&E's power plants, peaker stations, and extra-high-voltage substations, and are designed to significantly improve emergency response at each of these facilities.

4.1.4.4 Fire Coordination Personnel

As discussed in Section 5.2.3.2 below, SDG&E employs a full-time staff of five fire coordinators. The current fire coordinators on staff have over 150 years of fire suppression, prevention, and fire behavior experience collectively.

4.1.4.5 Ignition Management Program

SDG&E has established an Ignition Management Program (IMP), which tracks ignitions and potential ignitions and perform root cause analysis on each ignition or potential ignition to detect patterns or correlations. Such ignition or potential ignition events will be assigned to a mitigation owner from the business unit most logically positioned to eliminate or reduce future events of a similar nature. To that end, SDG&E is considering employing a forensic fire coordinator to implement and manage this program.

4.1.4.6 Fuel Management

Protection of SDG&E's electric system from wildfires is critical to system reliability and first responder and public safety. Wildfires burning near electric facilities pose a threat to public and firefighter safety and can also affect reliability if circuits fault because of smoke columns. Fuel management projects can lower the risk of catastrophic wildfires by reducing and

removing wildland fuel accumulations, such as live and dead vegetation. SDG&E, in partnership with fire departments, fire safe councils, and other stakeholders will seek to implement a comprehensive fuels management program to reduce wildfire fuel accumulations.

SDG&E has been involved with the following fuel management projects and initiatives:

- Member of the National Cohesive Wildland Fire Management Strategy – Western Regional Strategy Committee, which is a coalition of federal partners and other stakeholders committed to working together toward fire resilient landscapes, creation of fire adapted communities, and effective fire response through the treatment (reduction) of wildland fuels;
- Establishment of the Campo Indian Reservation fuel break, an approximately 50-acre fuel break adjacent to the international border and along the 500 kilovolt (kV) Southwest Powerlink;
- Funding of the Sunrise Powerlink Fire Mitigation Grant Program (CPUC mandated), which annually awards grants to eligible parcels to fund defensible space, structure hardening, and community fire protection projects;
- 4,000 acres of SDG&E lands currently receiving fuel treatment (by Realty Services) for the removal of wildland fuels;
- Various other projects/initiatives in the conception phase[50] with Orange County Fire, CalFire, and Camp Pendleton Fire.

4.2 Inspection Plan

SDG&E has formalized inspection plans for each of its three electrical infrastructure categories: distribution systems, substation systems, and transmission systems.

4.2.1 Distribution System Inspection

4.2.1.1 SDG&E Corrective Maintenance Program Inspections

SDG&E is required to inspect its electric distribution system according to Commission GO 165. GO 165 establishes inspection cycles and record-keeping requirements for utility distribution equipment. In general, utilities must patrol their systems once a year in urban areas and HFTD Tier 2 and Tier 3. Patrols in rural areas outside of HFTD Tier 2 and Tier 3 are required to be performed once every two years. SDG&E, however, exceeds the basic requirements and performs patrols in all areas on an annual basis. In addition to the patrols, utilities must conduct detailed inspections at a minimum every 3-5 years, depending on the type of equipment. For detailed inspections, the utilities' records must specify the condition of inspected equipment, any problems found, and a scheduled date for corrective action. Utilities are required to perform intrusive inspections of distribution wood poles depending on the age and condition of the pole and prior inspection history.

[50] The first phase (stage) of any fuel treatment project is the "concept phase" wherein the project is conceptualized and discussed amongst various stakeholders. In this instance, SDG&E is working with the Orange County Fire Department to conceive possible fuel treatment (vegetation reduction) projects.

SDG&E's Corrective Maintenance Program (CMP) is an inspection program, which consists of six different inspection categories with various, corresponding inspection cycle intervals per program. These are summarized in Table 3 below. These inspections are required by GO 165 unless otherwise noted.

Table 3: SDG&E Distribution System Inspection Cycle Intervals

Inspection Categories	Inspection Cycle Interval (in years)
• **Overhead Detailed** ○ Electric distribution structures and equipment ○ Electric distribution equipment on Communication Infrastructure Provider (CIP) poles ○ Electric distribution equipment on transmission poles	5
• **Underground Detailed**	
○ Underground Above Ground Dead-front, Internal and External Inspections (AGDF)	5
○ Underground Above Ground Live-front, Internal and External Inspections (AGLF)	5
○ Underground Subsurface with Equipment, Internal Inspections (SS3)	3
○ Underground Oil and Gas Switch Inspections (SW3)	3
• **Underground Subsurface without Equipment, Internal Inspections (SS10)**[51]	10
• **Wood Pole Intrusive Inspections (POIN)** ○ Electric distribution wood poles	10
• **Patrol (PATROL)**[52] ○ Electric distribution both overhead and underground structures and equipment ○ SDG&E owned or operated streetlights are inspected for structural problems or hazards.	1
• **QA/QC Inspections (HFTD Tier 3)**[53] ○ High Fire Threat District Tier 3	3

[51] This inspection type is not mandated by GO 165, however, SDG&E continues to perform this type of inspection.

[52] Although GO 165 allows for a two-year cycle, SDG&E patrols rural areas outside of Tier 2 and Tier 3 of the HFTD on a one-year cycle.

[53] As discussed in Section 4.2.1.2 below, these inspections exceed the requirements of GO 165.

4.2.1.2 Quality Assurance/Quality Control Inspections in HFTD Tier 3

SDG&E has implemented Quality Assurance/Quality Control (QA/QC) standards and programs throughout its service territory, with a special focus in the HFTD during fire season. These inspections exceed the requirements of GO 165. These proactive programs are designed to identify potential structural and mechanical problems before they fail. SDG&E has performed QC inspections of its overhead electric distribution poles in high risk fire areas with a focus on identifying items for which maintenance would improve fire safety and reliability, with a goal of mitigating the probability that SDG&E's overhead electric system, facilities, and equipment will provide the source of ignition for a fire. These QC inspections were conducted through 2016,[54] after which, SDG&E decided to continue the QC inspections in the subsequent years. In 2018, when the CPUC adopted the statewide fire threat map, SDG&E began applying the QA/QC three-year cycle to the newly defined HFTD Tier 3.

In addition, SDG&E performs a system maintenance patrol (similar to those specified by GO 165) of the entire overhead electric system in the HFTD on an annual basis. Safety related non-conformances identified in those patrols are scheduled for follow up repair.

Over the years, SDG&E has enhanced its system-management programs. Inspection and repair of SDG&E's electric system have particularly intensified in the HFTD, with CPUC mandated annual patrols in the HFTD Tier 3.

During 2016 to 2018, SDG&E performed QA/QC inspections on an average of 15,000 poles annually (approximately one-third of the distribution poles) in its then-existing "extreme" and "very high" fire threat areas. SDG&E continues to conduct the QA/QC detailed inspections in the newly defined HFTD Tier 3. Annual adjustments to the HFTD map, if any, will be reflected in the scope of this QA/QC program.

4.2.1.3 Monitoring and Auditing

SDG&E utilizes various reports to monitor its CMP progress, for both inspections and repairs. In addition, regular monthly meetings are held with various internal construction and operations centers to discuss detailed CMP progress.

Upon completion of prescribed actions necessitated by the CMP and the QA/QC inspections, SDG&E conducts an audit to ascertain the effectiveness of the inspections. This audit is run by SDG&E's operational and engineering managers, who are responsible for certain districts. They typically select about 1.5% of the combined (overhead and underground) territories and assess their conditions to see if the appropriate improvements have been properly carried out.

4.2.2 Substation System Inspection

Substation inspections are CPUC mandated and while they are conducted primarily for reliability, they have incidental wildfire mitigation benefits. The main goal of the Substation System Inspection and Maintenance Program is to promote safety for SDG&E personnel and contractors by providing a safe operating and construction environment. Additional goals

[54] Pursuant to an agreement with SED (formerly the Consumer Protection and Safety Division) as approved by D.10-04-047.

include: meeting all of the requirements of GO 174, achieving a level of station availability satisfactory to SDG&E as well as assuring compliance with all sections of the California Independent System Operator (CAISO) Transmission Control Agreement (TCA). These are accomplished through inspection and managed maintenance of the electrical transmission and distribution substations.

4.2.2.1 Inspection Frequencies

SDG&E's routine substation inspections are completed at reoccurring cycles as described in Table 4 below. Planned frequency is the cycle for which maintenance is regularly initiated. Acceptable frequency is the planned frequency plus the due time or condition tolerance within which maintenance shall be completed to be in compliance with filed maintenance practices.

Table 4: Inspection Frequencies

Inspection	Planned Frequency	Acceptable Frequency
Substation Security Check	Once per week	9 per 12 weeks
Substation Inspection	Once per month (Priority 1); Once per two months (Priority 2)	10 per every 12 months (Priority 1); 5 per every 12 months (Priority 2)
Substation Infrared Inspection	12-month Trigger	Due in 15 months

4.2.3 Transmission System Inspection

All SDG&E transmission system facilities covered by the Transmission Inspection practice are routinely inspected using visual and infrared inspection techniques. Inspections are completed by both ground and air. Non-routine inspections are scheduled depending on operational need. Inspections/patrols of all structures, attachments, and conductor spans are performed to identify facilities and equipment that may not meet California Public Resources Code (PRC) §§ 4292 and 4293 or GO 95 and GO 128 rules. SDG&E annually evaluates its maintenance practice to ensure that inspection intervals meet or exceed regulatory requirements.

4.2.3.1 Inspection/Patrol Types

To maintain transmission system reliability, SDG&E conducts a variety of inspection types to promote the safety of the general public as well as the personnel engaged in the maintenance and operation of overhead and underground electrical facilities. Inspections/patrols are prioritized based on safety, reliability, and operational need. The types of inspections/patrols that are performed are summarized in Table 5 below.

Table 5: Inspection Types

Inspection Types	Inspection Cycle (Years)
Fault/Safety Patrol	As Needed
Detailed Overhead & Underground Inspection/Patrol	Three
Visual and Infrared Overhead Inspection/Patrol	Annual
Special Inspection	As Needed
Climbing Inspection	As Needed
Wood Pole Ground Line Inspection and Treatment	Ten
Miscellaneous Inspection	As Needed

In addition to the inspections/patrols specified in the maintenance practice, SDG&E conducts an additional aerial patrol of 69kV transmission lines in HFTD Tier 3 prior to September 1st each year. Conditions of concern related to fire safety that are identified are addressed, as specified in GO 95 Rule 18.

4.2.3.2 Access Road Maintenance

SDG&E performs maintenance of a majority of its access roads on a two-year cycle, barring any permitting or agency delays. Road segments are tracked electronically to document the date and type of maintenance performed, who performed the maintenance, and which roads have biological or cultural restrictions. This road maintenance program is designed to provide SDG&E crews reliable access to transmission structures. Many public agencies utilize SDG&E's transmission access roads to traverse the back country and respond to wildfires that may be in the area.

4.2.4 Geographic Information System Data

Geographic information system (GIS) data of electric infrastructure qualifies as critical energy infrastructure information under federal law and as such, should be not be disclosed to the public.[55] SDG&E handles requests for GIS data of its electric infrastructure on a case-by-case basis and if disclosure is warranted, will provide the requested information confidentially. In response to the increasing desire to have the GIS data of electric facilities available to support statewide emergency preparedness, SDG&E is collaborating with agency stakeholders to find the best solution to provide the requested information in a timely manner. The initial step that

[55] 18 Code of Federal Regulations (CFR) § 388.113. Specifically, critical energy infrastructure information is defined as "specific engineering, vulnerability, or detailed design information about proposed or existing critical infrastructure that: (i) relates details about the production, generation, transportation, distribution of energy; (ii) could be useful to a person in planning an attack on critical infrastructure; (iii) is exempt from mandatory disclosure under the Freedom of Information Act, 5 USC § 552; and (iv) does not simply give the general location of the critical infrastructure." 18 CFR § 388.113(c)(2).

SDG&E plans to take to support this effort is to develop an ESRI Cloud Managed Services infrastructure for the controlled sharing of the requested information.

4.3 System Hardening Plan

SDG&E consistently evaluates, in consultation with vegetation management, environmental services, and construction services, prudent changes and improvements to its physical assets that could be made to harden the system against wildfire risk. SDG&E has implemented preventative operations, along with a construction and maintenance plan consistent with these evaluations. SDG&E has programs underway to strengthen and modernize its system as discussed in more detail below.

4.3.1 Design and Construction Standards

SDG&E has advocated for modernizing the rules and regulations governing the design and construction of overhead electric and communications facilities. To reflect the more stringent design and construction standards adopted by the Commission and to improve the performance of the SDG&E electric system in terms of meeting fire-prevention goals, the SDG&E Facilities Design Manual was modified to include an entirely new section aimed at providing guidance for hardening circuits against the risk of fire. These modifications include both proactive measures designed to reduce the incidence of ignitions and reactive measures by which SDG&E can respond to the threat of fires and mitigate the threat of fires.

4.3.2 Testing and Deploying Emerging Technologies

SDG&E continues to evaluate and incorporate new technologies and equipment into its overhead electric system. SDG&E's Electric Distribution Engineering department is responsible for evaluating and creating new equipment and use standards for emerging and pre-commercial technologies. Using equipment failure data, the department makes recommendations regarding which technologies should be incorporated into the SDG&E system and which could be improved prior to application. This department evaluates new types of technologies which may improve electric reliability and public safety and gives special attention to technologies that may contribute to SDG&E's fire safety goals and objectives. As an example, SDG&E is beginning to apply and analyze more advanced fault-clearing equipment that contain algorithms to improve the ability of the system to clear "wire-down" faults more quickly, which will serve to reduce the potential such faults might provide an ignition source.

4.3.3 Facility Analysis

In addition to adding, redesigning, and replacing facilities and elements as described above, SDG&E has implemented more stringent monitoring and inspection programs in the HFTD, which will intensify its efforts to identify facilities or elements that may need repair. As an example of these efforts, SDG&E is developing the use of pole-loading algorithms which more accurately calculate working loads and stresses. In addition, SDG&E coordinates these activities with communications infrastructure providers who jointly use SDG&E's poles and facilities.

SDG&E also maintains a comprehensive outage database, which is used for reliability measurement and reporting purposes. Correlations between outages and locations are analyzed to determine whether certain equipment is prone to outage or has the potential to be

an ignition source. This analysis is then matched to weather and other environmental conditions. Where it is determined that certain types of hardware have higher incidents of failure and potentially a higher incidence rate for ignition, they are replaced or prioritized for replacement. Vegetation Management, which is discussed in Section 4.4 below, also maintains a comprehensive outage database. Outages related to trees and or vegetation are investigated, documented, and the results analyzed to determine if additional pruning or removal measures are warranted to prevent any reoccurrence.

SDG&E uses three-dimensional light detection and ranging (LiDAR) surveys throughout its service territory. The most prevalent use of LiDAR has been for engineering and design purposes on the electric transmission system, including areas in the HFTD. In particular, this technology is being used to perform aerial scans of the 69kV transmission system in the HFTD on a three-year cycle. These surveys provide detailed three-dimensional depictions of SDG&E facilities, terrain, vegetation, and other obstacles in the vicinity of SDG&E's facilities. Once the LiDAR and imagery data is processed, it can be ingested into Computer-Aided Design (CAD) tools such as Power Line System Computer-Aided Design and Drafting (PLS-CADD). PLS-CADD can then be used to determine wire tensions, sag and sway, and can be used to calculate the structure mechanical loading (i.e., pole loading).

It can also analyze the clearances to vegetation, ground or other wires to verify compliance with GO 95 or other relevant standards. If potential issues are discovered along the 69kV system in the HFTD, SDG&E will address them per GO 95 requirements and SDG&E standards. In 2013, SDG&E began applying this same technology extensively on the distribution system through the FiRM program (described in Section 4.3.9 below), which has fire hardened over 7,000 poles and 350 miles of conductor to date in the HFTD. New distribution programs such as PRiME (described in Section 4.3.10 below), will utilize this technology as well.

4.3.4 Oversight of Activities in the Rural Areas

In 2016, SDG&E formed an Electric Risk Analysis (ERA) team to address safety and reliability risks for electric distribution infrastructure across the entire service territory with continued focus on reviewing equipment failures that cause wire down events.[56] The ERA oversees the evaluation of equipment data to support the various fire-hardening activities using these principles:

- Inform and utilize risk-informed prioritizations to address risk-mitigation;
- Improve design specifications to reduce the potential for igniting fires;

[56] In early 2010, SDG&E formed a multi-disciplinary technical team of subject matter experts called the Reliability Improvements in Rural Areas Team (RIRAT). RIRAT was tasked with: developing a multi -dimensional understanding of the complex fire-risk issue within the SDG&E service territory; assessing the conditions which pose the greatest risks related to fire; determining the level of risk mitigation that could be provided by various proposed projects; and assigning priorities to capital and operating programs and projects that could address fire-related risks in the high fire risk areas. In 2016, the RIRAT was replaced with the ERA team.

- Consider and, to the extent prudent and cost-effective, employ technology-based solutions to reduce fire risks and improve overall system reliability and safety;
- Systematically consider and evaluate options such as:
  - Fire-hardening sections of feeder circuits or individual circuit branches;
  - Strategic undergrounding to reduce the exposure of ignition from overhead facilities;
  - Adjusting protective equipment by revising settings, balancing loads, adding reclosers, replacing expulsion fuses with CalFire approved fuses, replace/remove high risk assets, and/or reduce fuse size; and,
  - Employing new construction standards and/or technologies, such as insulated overhead conductors, wireless fault indicators, "off-grid" solutions, and advanced reclosers;
- Replace higher-risk equipment based upon statistical analytics.

4.3.5 Asset Management

SDG&E is in the process of developing and implementing an asset management program to align with its overall risk management objectives. The new asset management system conforms with ISO 55000, an international standard that specifies the requirements for the establishment, implementation, maintenance, and improvement of an asset management system. Benefits of such a system may include enhanced asset safety, improved performance, managed risk, demonstrated compliance, and improved efficiencies and effectiveness of assets and operations. Asset Management is a critical element of SDG&E's focus on creating a sustainable and high-quality Safety Management System for electric operations.

SDG&E believes asset management will provide a means to optimize the Company's risk, performance, and investments while meeting or exceeding safety and regulatory objectives. A comprehensive asset management system will provide the access to and integration of data throughout the asset life cycle to develop analysis and a health index for critical assets. Using a health index of its assets, SDG&E can identify which assets have a likelihood of failure and the respective consequence(s) of the failure(s). Based on this information, asset strategies would be evaluated and implemented to manage the asset in a manner that aligns with SDG&E's overall risk management strategy. Asset management intersects with wildfire mitigation and prevention when failed assets located in the HFTD can potentially be the source of an ignition.

4.3.6 Overhead Transmission and Distribution Fire Hardening

SDG&E is committed to the fire hardening of its 69kV transmission and associated 12kV distribution system located in the HFTD. This hardening effort is a multi-faceted approach that starts with enhanced design criteria. Previous lines were constructed to withstand working loads under stress of 56 miles per hour (mph) wind speeds. The new electric lines are designed to withstand working loads under the stress of 85 mph wind speeds, and in some specific cases, up to 111 mph based on known local wind conditions. The new lines are being designed utilizing steel poles instead of wood. Steel poles are a more reliable construction material, giving more confidence in their designed strength and are more resilient should a fire occur leading to faster restoration times. These new steel pole facilities are being installed in

conjunction with the application of higher strength conductors and increased spacing between lines beyond the requirements of GO 95, resulting in a decrease in the likelihood of energized lines coming into contact with one another or arcing after being struck by flying debris. In addition, SDG&E's current design standards now reflect the use of the enhanced design criteria, steel poles over wood poles, high strength conductor, and increased conductor spacing in the HFTD. To date, SDG&E has hardened 19% of the HFTD by installing over 15,000 new steel poles and plans on further investment to continue to these efforts.

4.3.7 Underground Circuit Line Segments

The Commission approved a tariff rule change for SDG&E,[57] which allows for conversion of existing primary voltage overhead facilities to underground facilities along public streets and roads, and on public lands and private property in more fire prone areas where undergrounding is the preferred method to reduce fire risk and enhance reliability. SDG&E formed a team with expertise in the undergrounding of distribution systems and facilities to evaluate the undergrounding of circuit segments located in the HFTD within primarily the County of San Diego jurisdiction. These experts provided the County of San Diego with an understanding of the potential for undergrounding portions of the overhead system to mitigate the risk of fire and the results are being used on circuit analysis to propose underground portions where feasible. Conferences with County management and leadership are in progress to gain agreement on individual project prioritization. Design on these conversions are scheduled to begin in 2019 with anticipated construction in 2020.

In addition, SDG&E is evaluating undergrounding distribution lines in strategic situations, where a small amount of undergrounding would have a large impact by reducing a significant risk or limiting exposure to Public Safety Power Shutoffs for critical customers and communities.

4.3.8 Cleveland National Forest Fire Hardening

SDG&E currently operates and maintains a network of electric facilities located within the Cleveland National Forest (CNF). In 2016, SDG&E received a Master Special Use Permit (MSUP) to operate and maintain facilities within CNF. Specifically, the MSUP allows SDG&E to develop a series of projects and activities aimed at increasing the safety and reliability of existing electric facilities within and near the CNF. Final approval for these projects and associated permits have been received and work has been on-going since 2016.

These projects will increase safety and reliability of SDG&E's system by fire hardening existing electric infrastructure that currently serves the U.S. Forest Service, emergency service facilities (i.e., fire, communication, and other), campgrounds, homes, businesses, and other customers within the CNF and surrounding areas. The projects include the fire hardening of facilities and select undergrounding of several existing 12kV and 69kV electric facilities spread throughout an approximately 880 square mile area in the eastern portion of San Diego County. The existing electric lines located within CNF also extend outside of CNF boundaries. The overall project includes operational components complementing SDG&E's Community Fire Safety Program,

[57] D.14-01-002, adopting Tariff Rule 20D.

which in turn includes community outreach, new fire prevention measures, and enhanced emergency response.

The project design was based on various recommendations addressing fire prevention and the U.S. Forest Service's environmental values and aesthetics. Using an analytical matrix reflecting elements of fire risks and environmental concerns, SDG&E and the U.S. Forest Service collaborated to determine which sections of the electric system should be upgraded. Each segment required a custom solution based on many factors, including the location of the customer being served by the distribution system, the topography of the land, and various biological, cultural, and environmental factors.

Construction commenced on the Cleveland National Forest project in late 2016 and is planned to continue through 2020. Through November 2018, there have been a total of 63 miles of electric transmission and distribution lines fire hardened. This includes 45 miles of 69kV transmission lines and 516 structures replaced with steel and 18 miles of 12kV distribution lines and 302 structures replaced with steel. For 2019, SDG&E plans to replace 28 miles of 69kV transmission lines and 243 structures as well as 22 miles of distribution lines and 308 structures. SDG&E plans to complete construction on fire hardening activities on this project in 2020.

4.3.9 Fire Risk Mitigation

In 2013, SDG&E established the FiRM program,[58] an overhead distribution fire hardening re-building effort. The goal of the FiRM program is to address fire risk by hardening facilities in the HFTD by replacing aged line elements, utilizing advanced technology, and by safeguarding facilities by designing for known local weather conditions. FiRM is also tasked with developing a multi-year plan for the rebuilding of circuits of greatest fire-related risk. Prioritization and scoping of each FiRM project are driven largely by analysis using the WRRM and input from multiple stakeholders in the Company including operations and engineering.

Factors considered in the prioritization and scoping process include, but are not limited to, recent occurrences of a "wire-down," wind and weather conditions, fire risks, outage history, conductor size and type, condition of equipment, environmental conditions, and resulting customer impacts. FiRM projects are scoped on a circuit-by-circuit basis by considering various risk factors. Risk mitigation methods include fire-hardening older conductor and poles, as well as other targeted fire risk mitigation methods of the circuit, including removal of equipment, long span elimination, and advanced technology implementation (namely, falling conductor protection and LiDAR survey data captured via Unmanned Aerial Vehicles (UAVs)).

To date, the FiRM program is currently 24% complete having replaced over 7,000 poles and 350 miles of wire. SDG&E plans to continue this effort for the foreseeable future as there are still 1,100 miles of aged high-risk conductor remaining within the HFTD in SDG&E's service territory. At this current rate of reconductoring approximately 84 miles of high-risk conductor per year, it will take SDG&E approximately 13 years to complete this focused effort with the current

[58] This program was requested in SDG&E's TY 2019 GRC (A.17-10-007), which is still pending. Funding levels and associated activities are dependent on the outcome of this pending GRC.

resources and budget. However, given the California fires of 2017 and 2018 and the elevated risk climate change has brought to the state, SDG&E is planning to accelerate this effort to replace these older line elements by 2025 (years 2019-2025). The increased scope of work would begin engineering and design in 2019 and construction in 2020.

4.3.10 Pole Risk Mitigation and Engineering

The Pole Risk Mitigation and Engineering (PRiME) program[59] was developed by SDG&E to assess pole strength and integrity considering loading conditions, third party attachments, localized weather conditions, and remaining pole strength throughout SDG&E's service territory. PRiME does not overlap with existing programs, such as FiRM or CNF. SDG&E's goal is to perform pole loading assessments on 170,000 wood distribution poles throughout its service territory. PRiME will focus its efforts in HFTD Tier 3 and Tier 2. Assessments on SDG&E's highest risk poles within Tier 3 and Tier 2 of the HFTD will be completed prior to poles located outside of the HFTD. Poles identified that require construction activities through assessment and follow-up analysis, will be remediated as they are identified. SDG&E anticipates performing approximately 700 pole remediations in 2019 and estimates approximately 1,700 pole remediations in 2020. At the current rate, it is anticipated that remediation activities will be completed in eleven years within the HFTD. However, SDG&E is planning to accelerate this effort to complete remediation activities by 2027 (years 2019-2027). The increased scope of work would begin engineering and design in 2019 and construction in 2020.

The tools and information have improved significantly over time, and the PRiME program leverages these improvements including LiDAR imaging of the structures and lines, PLS-CADD modeling software, weather, inspection, and third-party attachment data to take SDG&E well beyond the visual to a full engineering analysis of its overhead assets. This program allows SDG&E to mitigate asset integrity risks within the HFTD.

4.3.11 Expulsion Fuse Replacement

SDG&E continues to enhance its electric distribution system and reduce equipment with potential ignition sources. With the consistent analysis of data, new fire prevention methods and a continued effort by vendors to satisfy California's increasing fire threats, SDG&E is constantly rethinking and analyzing equipment. SDG&E's engagement with vendors to require equipment to be approved by CalFire as an exemption equipment[60] has educated many vendors with the concerns and issues facing not just SDG&E, but all utilities in California. Vendors have understood this challenge and proposed several new products. The new program

[59] This program was requested in SDG&E's TY 2019 GRC (A.17-10-007), which is still pending. Funding levels and associated activities are dependent on the outcome of this pending GRC.

[60] CalFire is the primary fire protection agency with the responsibility for enforcing the requirement for a 10-foot clearing of vegetation around poles or towers. CalFire has the discretion to grant temporary exemptions for equipment that has successfully passed CalFire's defined exemption procedure, which includes a test to determine if the equipment can be classified as fire safe, by not creating arcs, sparks or hot particles that would ignite flammable vegetation. Upon successful completion of the test, the equipment is required to be installed for several years to ensure operation of the equipment does not ignite a flammable vegetation. PRC § 4292.

detailed below, highlights SDG&E's efforts and continuous strive to reduce ignition sources within the HFTD.

When the distribution system experiences a fault or overcurrent, there are fuses connected to the system to protect its integrity and isolate the fault. These expulsion fuses are designed to operate by creating a significant expulsion within the fuse, resulting in the fuse opening and isolating the fault, and in turn limiting further damage of other equipment. Because of this internal expulsion, the fuses are equipped with a venting system that sends a discharge of energy out of the fuse and into the atmosphere. This external discharge has the potential to ignite flammable vegetation.

To mitigate this potential, SDG&E has developed a three-year program[61] to proactively replace existing expulsion fuses within the HFTD with CalFire approved power fuses.[62] There are approximately 7,100 expulsion fuses in SDG&E's HFTD, and this new program is designed to lessen the chance for an ignition source in the HFTD by reducing external discharges or venting required for the existing expulsion fuses and reducing the energy associated with the fuse operation. In 2019, this program will prioritize the replacement of the expulsion fuses to the CalFire approved power fuses by starting in the Tier 3 HFTD and then moving to Tier 2 HFTD. SDG&E anticipates completing this program by 2021.

4.3.12 Hotline Clamps

Through equipment failure analysis related to wire down outages, SDG&E has identified high risk connectors known as "hotline clamps" that SDG&E intends to replace as part of the Hotline Clamp program. SDG&E has utilized the QA/QC inspections discussed in Section 4.2.1.2 above to identify over 6,000 structure locations with this type of connector within the HFTD. This maintenance program to replace these connectors is planned to begin in 2019, and will continue through 2025.

4.3.13 Wire Safety Enhancement

The Wire Safety Enhancement (WiSE) program[63] is designed to mitigate risk by hardening electric distribution overhead infrastructure and protection systems. WiSE addresses public safety risks in wildland urban interfaces where conductor or connection equipment failures may cause wildfires, and near dense urban populations (e.g., schools, public gatherings) where the likelihood of public contact may be increased.

Conductor equipment failure can pose serious risks to public and employee safety due to potential ignitions in fire vulnerable areas as well as causing serious injuries or fatalities due to touch or step potentials. Although WiSE was originally developed to harden the distribution

[61] This program is new and was not requested in SDG&E's TY 2019 GRC (A.17-10-007). If approved, funding for this program will utilize the FRMMA, which will be subject to a reasonableness review in SDG&E's TY 2022 GRC.

[62] The power fuses are equipment that have been previously granted an exemption from CalFire.

[63] This program was included in SDG&E's 2016 RAMP and TY 2019 GRC (A.17-10-007) as the Small Conductor Replacement Program. Funding levels and associated activities are dependent on the outcome of SDG&E's pending GRC.

system outside the Tier 3 and Tier 2 HFTD, recent events such as the California wildfires of 2017 and 2018 have provided evidence of the increasing risk to communities within the wildland urban interface. These factors, coupled with record wind speeds and dry vegetation measured in San Diego's coastal canyons in recent months, have caused the need to refocus this program to mitigate potential ignitions within the wildland urban interface located outside the HFTD.

WiSE will apply new technologies to update equipment with hardened construction standards and materials. The resulting infrastructure enhancements may include wire upgrade, connector replacements, switch placements or replacements, long span removals, strategic undergrounding, and modifications to advanced protection systems. Design considerations will be driven by area-specific conditions that could include anti-corrosion materials for connectors or conductors, replacement of wood poles where fire hardening is beneficial, replacing bare wire with covered conductor to reduce wire downs caused by foreign object contact (e.g., avian, vegetation, Mylar balloon, etc.), and strengthening conductors that are vulnerable to high wind storm events.

WiSE will focus on utilizing multi-attribute risk modeling to drive optimal risk reduction with considerations for factors including, but not limited to historic wire down events, projected wire down failures by asset type, proximity to vegetation, condition or age of assets, inspection records, susceptibility of corrosion, meteorology conditions, length of the conductor span, proximity to dense or sensitive public areas (e.g., schools, residences, parks, etc.), and conductors that cross major freeways or roadways. The risk model will be focused on these risk parameters within the wildland urban interface boundary first. In 2019 through 2020, WiSE will prioritize the highest risk circuit elements within the wildland urban interface and commence hardening efforts.

4.3.14 Covered Conductor

SDG&E's vegetation profiles in the HFTD and the wildland urban interface consist mostly of sparse trees and heavy brush. In general, the overhead electrical equipment in these areas are not in close proximity to dense vegetation. Given this specific vegetation profile, SDG&E has focused its hardening efforts on installing high tensile strength conductors to reduce the risk of downed wire; increasing phase spacing to reduce the risk of wire to wire contact; installing steel or composite structures sized to withstand high wind conditions; and deploying advanced protection systems designed to detect and isolate issues quickly and minimize the energy produced when faults occur. SDG&E believes this is a prudent approach for reducing the risk of wildfire to much of its system.

SDG&E also sees the benefits of a targeted approach to installing covered conductor in areas where electric infrastructure is near dense vegetation. However, there are factors that need to be considered when installing covered conductor. If a covered conductor fails and falls to the ground, it is possible that a high impedance fault would occur. High impedance faults, even with sensitive relay settings enabled can be very difficult to detect, leading to the potential for downed energized wires.

Today, SDG&E has over five miles of covered conductors installed where its overhead electrical equipment is in close proximity to dense vegetation and where outage history supports this

type of installation. SDG&E believes the use of covered conductor in certain applications can be beneficial and will continue to utilize covered conductors in those applications.

4.3.15 Fire Threat Zone Advanced Protection

The Fire Threat Zone Advanced Protection (FTZAP) program[64] develops and implements advanced protection technologies within substations and on the electric distribution system to: reduce and/or mitigate the risks of utility caused fire incidents; create higher visibility and situational awareness in fire prone areas; and allow for the implementation of new relay standards with improved coordination in locations where it is difficult due to lower fault currents.

More advanced technologies such as microprocessor-based relays with phasor measurement (PMU) capabilities, automation controllers, sectionalizing capabilities, line monitors, direct fiber lines, and communication radios comprise a portfolio of devices being installed in substations and on distribution circuits to allow for a more comprehensive protection system along with greater situational awareness via SCADA in the fire prone areas of the HFTD. This portfolio of advanced technology allows SDG&E to implement new protection systems, such as:

- **Falling Conductor Protection** designed to trip distribution overhead circuits before broken conductors can reach the ground;
- **Sensitive Ground Fault** for detecting high impedance faults resulting from downed overhead conductors;
- **Sensitive Profile Relay Settings** enabled remotely on distribution equipment during red flag events to reduce fault energy and fire risk;
- **High Accuracy Fault Location** for improved response time to any incident on the system;
- **Event Reporting** for post analysis of system disturbances or outages;
- **SCADA Communication** to all field devices being installed for added situational awareness; and
- **Protection Integration with Private LTE** as a means of facilitating the communication infrastructure needs.

In 2019, FTZAP aims to replace aging infrastructure in substations such as obsolete 12kV substation circuit breakers, electro-mechanical relays, and Remote Terminal Units (RTUs) with new circuit breakers, microprocessor-based relays, and RTUs that facilitate the requirements of SDG&E's advanced protection systems. On the distribution circuits, FTZAP works with the FiRM program to strategically install and/or replace sectionalizing devices, line monitors, direct fiber lines, and communication radios to facilitate the requirements of SDG&E's advanced protection systems.

[64] This program was requested in SDG&E's TY 2019 GRC (A.17-10-007), which is still pending. Funding levels and associated activities are dependent on the outcome of this pending GRC.

4.3.16 LTE Communication Network

SDG&E plans to deploy long-term evolution (LTE) using a dedicated radio frequency (RF) spectrum. This will improve the overall reliability of SDG&E's communication network, which is critical for fire prevention and public safety. This RF spectrum will be lower frequency with higher transmit power levels, which will allow the LTE network to operate over broader areas and in the presence of foliage. LTE is a globally recognized standard, with a very broad ecosystem made up of multiple vendors that provide equipment that is certified inter-operable. This effectively eliminates the risk of deploying equipment that could be stranded due to a vendor's support being eliminated. It also allows SDG&E to deploy equipment that best fits a particular deployment, whereas proprietary systems generally have a limited number of configurations, there are myriad LTE configurations available to select from.

The LTE network significantly increases the reliability of remote communication, which is critical for the technology discussed in Section 4.3.15 (Fire Threat Zone Advanced Protection) to function as intended. In addition, there are currently holes in the coverage of third party communication providers in the rural areas of east county San Diego that limit SDG&E's ability to communicate with field personnel during red flag crew deployments and Emergency Operations Center activations. The installation of LTE in Tier 3 and Tier 2 of the HFTD will reduce these gaps, allowing for more timely and reliable communication and information from SDG&E's field crews to emergency management leadership in these critical situations.

4.3.17 Automated Reclosers

As part of its Community Fire Safety Program, and as discussed in Section 4.1.2 above, SDG&E has completed a large deployment of overhead distribution reclosers, focusing heavily on the HFTD. While recent Operating Conditions typically have not allowed for the enabling of automated reclosing,[65] this equipment allows SDG&E to operate its system with significantly reduced energy flows during reclosing operations and provides the ability to sectionalize various elements of the distribution system to better manage system operations and reliability. Additionally, SDG&E has associated these remote SCADA controlled sectionalizing devices with specific wind anemometer locations, allowing for targeted applications of the Public Safety Power Shutoff to the areas that pose the most significant real time system condition risk of wildfire.

4.3.18 Public Safety Power Shutoff Engineering Enhancements

This program mitigates the impact to customers and communities involved in Public Safety Power Shutoff (PSPS) events by adding remote sectionalizing devices. Additional remote sectionalizing devices allow PSPS events to be more precise, which reduces the outage impact to customers. SDG&E is evaluating locations for these sectionalizing devices and based upon the results of the analysis, SDG&E plans to install additional units in 2019 and 2020.

[65] *See* Section 4.1.1

4.3.19 Pole Replacement and Reinforcement

The Pole Replacement and Reinforcement program replaces deteriorated wood poles identified through inspections. Wood pole damage is attributed to numerous factors including, but not limited to, the loss of original preservative treatment experienced with Penta-Cellon poles,[66] the presence of fungi decay, and bird and/or termite damage. The Pole Replacement and Reinforcement program is designed to comply with GO 165.

In 2019, the wood pole intrusive inspections are cycling though structures located in the HFTD. Pole replacements associated with deteriorated structures found on these intrusive inspections reduce the risk of ignitions by preventing wood pole failures. In addition, poles replaced in these areas will be constructed to SDG&E's improved design criteria, meaning they will be replaced with a steel pole that will meet the known local wind conditions of the area. For poles identified for replacement in Tier 3 of the HFTD, SDG&E intends to accelerate the replacement including the design, engineering, and construction of the new structures faster than the required six-month time frame mandated by the general orders. This will reduce the risk of wildfire by replacing poles that fail inspection on an accelerated schedule within the highest risk areas.

4.3.20 Backup Power for Resilience

The National Academy of Sciences defines "resilience" as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. During extreme fire threats, SDG&E will likely de-energize power lines that serve backcountry communities. To mitigate some of the impact to these communities, SDG&E intends to implement a Backup Power for Resilience project, which will provide back-up power to critical infrastructure (i.e., fire stations, Community Resource Centers, and others) in these areas. This project focuses on investing in infrastructure to provide back-up power to strategic locations. SDG&E's plan to deploy these backup facilities furthers the integration of technology in support of the safe and reliable operation of the distribution grid. This project will help customers most impacted by extreme fire weather events receive resilience benefits.

As part of this Plan, SDG&E will continue to pursue this initiative with the intent of establishing support in areas that will help mitigate the impact of these extreme weather events on its most impacted communities, while also providing overall grid resiliency and other electrical distribution grid operations and services. Other critical service providers (i.e., water agencies, communication providers, and others) should also consider enhancements to improve their resiliency.

SDG&E is also expanding upon or developing new programs and strategies, leveraging backup power for resilience to mitigate the risk associated with Public Safety Power Shutoffs. These programs are specifically related to resilient internet connectivity at fire stations, the expansion of the Community Resource Center Network and the potential development of a grant program

[66] Pentachlorophenol is a pesticide and Cellon is a preservative treatment for wood poles used by the DOW Chemical Company to inject pentachlorophenol using a liquid petroleum gas such as propane.

for portable generation targeted at residential customers are further discussed in Section 4.7.5 below.

4.4 Vegetation Management Plan

As part of its efforts to make its electric system more resilient, particular to wildfires, as well as comply with relevant Commission rules and state law, SDG&E designed and actively maintains a vegetation management program aimed at keeping trees and brush clear of electric power lines.[67] SDG&E's vegetation management program involves several components, such as: tracking and maintaining a database of trees and poles that are located close to electric infrastructure; regular patrolling, pruning, and identifying and removing hazardous trees and replacing with the right tree at the right place; pole maintenance with pole brushing and clearing; training first responders in electrical and fire awareness; and red flag operations. These program components are discussed in more detail below.

4.4.1 Tree Database

Early in the inception of its vegetation management program, SDG&E created an electronic database to track and manage trees in close proximity to its electric infrastructure. SDG&E's database contains records for over 460,000 known, specific trees located near its electric power lines. Inventory trees are defined as those with the potential of impacting the power lines by encroachment and/or tree failure within three years of inspection date. All trees in SDG&E's database are monitored using known species growth rates, with additional consideration given to the amount of rainfall occurring during periods affecting overall tree growth, and past pruning practices. Each inventory tree is assigned a unique alpha-numeric identification number within the electronic database, which allows the activity history of each tree to be tracked.

4.4.2 Patrol and Pruning

To comply with Commission rules as well as state and federal laws, SDG&E developed and maintains a vegetation management work plan, which is a schedule-based approach to its operations to ensure that applicable lines within its service territory are inspected each year. SDG&E divides its service territory into distinct zones known as Vegetation Management Areas (VMA). SDG&E's activities in each VMA are driven by a master schedule that identifies specific activities that are calendared to take place in each VMA every year. The activities include: pre-inspection, audit of pre-inspection work, tree pruning and removal, pole brushing and post trim and brushing audits. This process is managed through SDG&E's Vegetation Management System, an electric tracking system which was developed to store records of the vegetation management program activities.

[67] SDG&E's vegetation management program complies with current regulatory requirements, such as GO 95, Rule 35 and PRC §§ 4292 and 4293, and in some areas, exceeds the minimum regulatory requirements. It also follows the North American Electric Reliability Corporation (NERC) vegetation reliability standard FAC-003-04.

SDG&E has historically utilized a contractor workforce[68] to perform the vegetation management program activities of tree pre-inspection, tree pruning and removals, pole brushing, and quality assurance. Work performed by the contractor workforce is recorded and issued via work orders within the vegetation management program electronic work management system. During pre-inspection activity, trees in proximity to SDG&E's powerlines are inspected and evaluated and the tree condition in the database is updated accordingly. Each tree is visited by a certified arborist on an annual cycle. The annual inspections are routine maintenance and hazard tree assessments are performed to verify that inventory trees will remain compliant for the duration of the cycle and/or is pruned according to accepted standards and clearances. Trees that will not maintain compliance or have the potential to impact powerlines within the annual pruning cycle are identified to be worked on by the tree contractor. After the pre-inspection activity, a quality assurance audit is performed to verify the quality and accuracy of the inspection activities and tree listing prior to initiating a tree trim work order. Based on a field inspection, the auditor randomly samples at least 10 percent of the pre-inspection work to validate the completeness and accuracy of the data from the pre-inspection. Once the results are reviewed and the audit finalized, the trimming work is assigned to a tree contractor who completes the pruning and/or removal activity.

During the tree pruning activity, the contractor determines what pruning and/or removal is required to achieve the required clearances to maintain annual compliance. Over time, SDG&E has established, as part of its routine operations, maximum post-pruning clearances and the removal of all tree branches that overhang the conductors. Where prudent and achievable, SDG&E's contract tree crews prune vegetation back to 12 feet (or more) in alignment with CPUC GO 95, Rule 35, Appendix E guidelines. The clearances obtained are determined by factors such as species, tree growth, wind sway, and proper pruning practices. Tree growth rates can be categorized based on species. For example, species such as eucalyptus may grow 12-15 feet within a year. Therefore, fast-growing species may require a post-pruning clearance of at least 16-20 feet to remain compliant with minimum clearance requirements for the annual cycle.

SDG&E tree contractors follow American National Standards Institute (ANSI) A300 industry tree standards and the concept of directional pruning, which fosters the health of a tree while maximizing clearance and extending the pruning cycle. All tree branches overhanging conductors are considered a potential risk, therefore, SDG&E removes all branches that cross the vertical plane of the conductors from the conductor to the top of the tree. Once the work is completed, the tree crew updates the tree information and records the work performed in the database and Vegetation Management System. On average, SDG&E prunes approximately 175,000 trees each year and removes approximately 8,500 non-compatible trees.

The scoping operations for complete tree removals includes the chipping of all material and removal of the debris off-site. The only material left on site during tree removals is the larger wood (> 6-8-inch diameter). Any large debris left is positioned to prevent movement of the

[68] SDG&E manages its contractor safety through ISN and holds its contractors accountable for their performance. Contractors are expected to adhere to the same safety-related protocols as SDG&E employees.

material by gravity. All debris associated with pruning and removal operations is removed from watercourses to prevent flooding or degradation of water quality. Tree removal operations that may occur in sensitive environmental areas are reviewed to determine protocols that must be followed to protect species and habitat.

As explained in Section 2.1 above, the Commission has refined and remapped the fire threat areas in California and established the HFTD. This also changed the areas where increased minimum clearances apply. It is within these newly-defined areas that SDG&E continues increased, annual hazard tree inspections and performs maximum post-pruning clearances. Prior to fire season, SDG&E requires vegetation management contractors to perform annual training on hazard tree assessment. This refresher training helps set the stage for a second inspection, and a corresponding tree-hazard evaluation is performed for each tree within the HFTD. The tree evaluation includes 360-degree assessment of every tree within the "strike zone" of the conductors and maximizes the time-of-trim clearances. The strike zone includes the area adjacent to powerlines with trees that are tall enough to potentially strike the overhead facilities if the tree were to fail. To the extent unsafe clearances exist, an order to clear vegetation is issued and trimming is completed prior to September 1st of each year. These activities ensure safe minimum vegetation clearances are achieved prior to the peak fire season.

4.4.3 Enhanced Inspections, Patrols, and Trimming

In response to the ongoing and increasing threat of wildfire risk throughout California and the region, SDG&E will take steps to enhance its vegetation management program to further mitigate wildfire risk in the HFTD. In particular, SDG&E will enhance its routine inspections within the annual cycle, increase the amount of off-cycle patrols, and expand its tree trim scope.

During the annually scheduled routine inspection activity, the pre-inspection scope for all VMAs will be increased to include trees within the strike zone of transmission and distribution electric facilities. Trees tall enough to strike overhead electric lines will be assessed for hazardous conditions and tree crown height will be reduced or removed to prevent a line strike from either whole tree failure or limb break out. This would include dead, dying and diseased trees, live trees with structural defect, and locations with dense tree population that could strike as a result from wind exposure. Greater consideration will be given to environmental conditions that can impact a tree's relationship to the electric facilities such as wind sway and line sag. This same scope and criteria will be applied during an off-cycle tree patrol of all VMAs within SDG&E's service territory. These additional patrols will be timed to occur mid-cycle with the routine inspection to ensure all lines are reviewed twice annually and applying the enhanced scope.

SDG&E's tree trim scope will be increased to achieve a 25 feet clearance post-trim within the HFTD where feasible between trees and electric facilities. This is a significant increase over the average 12 feet of clearance that SDG&E currently achieves post-trim. There may be some barriers to achieving this goal. Environmental agencies, land agencies, and customers may oppose the tree pruning at this new clearance level, however, SDG&E hopes to work through these issues to achieve the desired wildfire risk mitigation. The trees targeted for enhanced

trimming are the trees within the strike zone as described above. All tree operations will employ the concept of directional pruning wherein all branches growing towards the lines will be rolled back to direct the growth away from the lines and to increase the post-trim clearance. These activities are expected to incrementally decrease the risk of tree branches coming into contact with electric facilities either by encroachment by growth or limb or complete tree failure.

4.4.4 Technology

As an added enhancement to the tree inspection activity, SDG&E utilizes LiDAR to assist in directing inspectors to trees that are outside the utility right of way that are tall enough to fall and strike powerlines. This helps to ensure all trees are properly assessed during the inspection. SDG&E is researching future use of LiDAR to identify change detection on poles and equipment, and as a compliance component for post construction and post pruning activities. Currently, LiDAR acquisition, classifying of the data, and modeling of the data is very time consuming and costly. The turnaround time for information has not yet proven to support such use cases in the field.

As another tool in the management of its inventory trees, SDG&E has in recent years implemented the use of Tree Growth Regulators (TGR), which is a chemical application that dramatically reduces the new shoot growth of trees. Results have shown that the use of TGR can reduce the frequency of pruning some species up to three years. An added benefit of using TGR is that it provides growth reduction, root and leaf enhancement, and in some instances can help with disease and insect protection.

SDG&E is beginning to integrate more data science into its vegetation management plan in an effort to have a more analytical approach. The first step, which is planned for 2019, is to data-mine the full vegetation management dataset and investigate additional operational uses for the database containing the full inventory of the over 460,000 trees managed. The goal of this initiative is to leverage machine learning and artificial intelligence techniques to correlate SDG&E's extensive vegetation and meteorological datasets to gain additional insights on how atmospheric conditions impact growth rate of certain species and identifying certain high-risk vegetation areas.

4.4.5 Quality Assurance

Upon completion of the tree pruning/removal activity within a VMA, a certified arborist performs a quality assurance (QA) audit on a representative sample of completed work to ensure compliance with scoping requirements. During the QA audit, the certified arborist also performs a cursory inspection of all the powerlines within the VMA for any trees that will not remain in compliance with applicable regulatory requirements until the next trim cycle. The results are then reviewed with SDG&E and the contractor to determine if any additional work is required.

4.4.6 Hazard Tree Removal and Right Tree-Right Place

SDG&E implemented and maintains a system-wide tree removal program to remove problematic species such as eucalyptus and palms. In addition, SDG&E established a "Right Tree-Right Place" program to assist customers in the selection of tree species and planting locations with the goals of minimizing interference with nearby powerlines and facilities, and maximizing energy saving and environmental benefits with carbon sequestration. SDG&E also offers free tree replacements in the event that an existing tree cannot be maintained safely near powerlines and should be removed rather than trimmed. Notably, SDG&E has, for the 16th consecutive year, been recognized by the National Arbor Day Foundation as a "Tree Line USA" utility company in recognition of "best practices" combining worker education and training, public outreach, quality tree care, and system reliability.

Hazard tree evaluation is a critical component of SDG&E's vegetation management program operations in the effort to reduce tree-related outages and avoid fire ignitions. SDG&E utilizes International Society of Arboriculture-certified arborists to perform its hazard tree inspections. These individuals also receive annual hazard tree inspection training to stay current with best practices. SDG&E has actively pursued the removal of non-compatible tree species such as eucalyptus with known tendencies for branch or trunk failure, and trees that were dead, dying or structurally defective. When a tree is considered a hazard, meaning that it poses a threat that will not hold until the scheduled trim date or is found to be out of compliance with clearance requirements, the tree is pruned on a priority basis, sooner than it would be under the Master Schedule. Such trees are generally pruned the same day as inspected, within 24-48 hours, or within a few weeks, depending on the severity of the hazard, as determined by the person evaluating the tree.

SDG&E has also initiated off-cycle, additional patrols of selected species such as bamboo and Century plants. These species are unpredictable and fast-growing and therefore pose a unique challenge to manage near powerlines. As such, these incremental patrols help target and remove such problematic species before they can become a danger. In addition, SDG&E implemented a broader scope in the removal of palms adjacent to its powerlines. SDG&E targets palms for removal that are located up to 65 feet away, that have the potential to shed fronds onto the powerlines and possibly cause an outage or fire.

4.4.7 Pole Brushing

SDG&E performs pole brushing in the State Responsibility Area (SRA) of the state in compliance with PRC § 4292. This requirement is regulated by CalFire, the agency with primary responsibility for fire suppression in those areas. Pole brushing involves clearing vegetation, flammable brush, and other materials around the base of electric power poles in an effort to prevent pole equipment-related ignition sources. Currently, there are approximately 84,000 distribution and transmission structures that are inspected annually to comply with PRC § 4292. SDG&E manages approximately 35,000 poles within the SRA that are designated as subject poles that carry "non-exempt" equipment. To further reduce potential ignition sources, SDG&E's Vegetation Management team works closely with SDG&E's FiRM team and engineering to reduce the number of non-exempt powerline components by replacing such

equipment, where feasible, with exempt equipment, which should also reduce the potential for pole attachments to become an ignition source.

Since 2003, SDG&E uses a three-phase approach to more effectively manage subject poles. This approach includes: chemical pole brushing, mechanical pole brushing, and re-clear pole brushing. Chemical pole brushing involves clearing all vegetation from around the pole base and applying an Environmental Protection Agency (EPA) approved herbicide. SDG&E treats approximately 10,000 poles, during the fall and winter months, with a pre-emergent herbicide to minimize vegetative re-growth and reduce overall maintenance costs. Not all subject poles can be treated with herbicide due to environmental constraints, which include considerations such as slope, proximity to water, proximity to trees and other vegetation, and customer approval.

SDG&E annually performs various types of pole brushing and does so during different times of the year. Mechanical pole brushing involves the removal of vegetation from around the pole base using mechanical means. Mechanical brushing is typically performed in the spring months. Re-clear pole brushing, performed in summer months, involves removing any additional flammable vegetation which has grown into, or blown into, the required clearance area since the last maintenance activity. The need to revisit a subject pole multiple times is not uncommon due to leaf litter blown back into the managed clearance zone during windy conditions, and due to the growth of weeds and grasses that cannot be easily controlled by mechanical clearing or herbicide treatments. Trees adjacent to subject poles also require pruning to keep dead, dying or diseased tree limbs, branches, and foliage from encroaching into the radius of the cleared circle from ground up to the height of the electrical conductors.

4.4.8 Electric Equipment Training

As previously mentioned, CalFire performs inspections in compliance with PRC §§ 4292 and 4293 in the SRAs. SDG&E provides electrical equipment training to CalFire representatives so that SDG&E is maintaining proper clearances of vegetation to conductors and equipment prior to the start of the fire season. While CalFire inspections have been jointly performed with SDG&E, this training is intended for CalFire to better understand the operation of the electric system and which equipment should be targeted to best prevent an ignition source. This training can be used by CalFire while they are conducting their day to day operations and inspections.

4.4.9 Red Flag Operations

During elevated or extreme weather events that could lead into a designated RFW, SDG&E's vegetation management contractors are kept informed of these conditions allowing them time to relocate crews into safe work areas. In instances of emergency tree pruning during extreme fire conditions, additional fire equipment and/or support from the contracted, professional fire services may be utilized.

In advance of a forecasted RFW, vegetation management will determine if patrols are warranted to re-assess tree conditions in advance of, during, or immediately following red flag events. SDG&E's Meteorology team will work with the Fire Coordination and Vegetation

Management departments to determine where this activity should occur. These inspections are incremental to the routine cyclical inspections performed by this group.

4.5 Situational Awareness Protocols and Determination of Local Conditions

Wildfire has been identified as the greatest weather-related risks to SDG&E, due to the region's complex topography, lack of summer and early fall rains, and susceptibility to dry Santa Ana winds that can accelerate fire growth. Because of the known wildfire risk and the potential impacts on utility operations, SDG&E has taken a multitude of steps to adapt to the changing climate conditions across its service territory.

Although the risk of fire is a year-round reality, there are certain recurring environmental and weather conditions that contribute to abnormally high fire risk in the SDG&E service territory. SDG&E's fire prevention and risk mitigation activities operate year-round with intensive data gathering and data analysis so that, when these abnormal and dangerous conditions occur, SDG&E is prepared to mobilize personnel and resources to abate, mitigate, and respond to these conditions. The sections to follow provide a description of the situational awareness platform that has been developed by SDG&E to mitigate wildfire risk.

4.5.1 Fire Science and Climate Adaptation Department

A large part of being prepared for and mitigating the threat of fire is recognizing the fact of environmental and situational evolutions. SDG&E's service territory has experienced drought and increased tree mortality, which compound the severity of and threat of the potential for an ignition. In recognition of these changing conditions, SDG&E restructured resources and, in early 2018, established a Fire Science and Climate Adaption (FS&CA) department comprised of meteorologists, community resiliency experts, fire coordinators, and project management personnel. The department's purpose is responding to and strategizing for the ever-changing utility industry's fire preparedness activities and programs. As climate change, community growth, and other evolutionary trends continue to impact the region, the FS&CA department must likewise evolve to address and provide situational awareness around emerging threats to utility infrastructure.

4.5.2 SDG&E Meteorological Capabilities and Technologies

4.5.2.1 SDG&E Meteorology Team

SDG&E has five full-time degreed and experienced meteorologists on staff with expertise in program management, utility forecasting, data science, and Southern California fire weather. Their responsibilities include analyzing historical weather and, importantly, monitoring incoming weather data in real-time. They also provide a detailed daily forecast of weather conditions relevant to SDG&E's operations.

4.5.2.2 SDG&E Weather Network

SDG&E owns and operates a network of over 175 weather stations that are physically located on electric distribution and transmission poles and provide temperature, humidity, and wind observations every 10 minutes. This allows weather conditions to be monitored in near real-time on every distribution circuit and transmission line across the fire-prone areas of the SDG&E service territory. Each weather station location was carefully selected by SDG&E

meteorologists based on their knowledge of the local terrain and its influence on meteorological conditions.

The siting process begins with a detailed examination of the terrain along a given circuit or tie line using a combination of Google Earth, topographical maps, and subject matter expertise of known local wind conditions. Once a site has been identified, a field visit is conducted to visually confirm the lay of the land and suitability for a weather station. Some circuits and tie lines cross dozens of miles through complex terrain, requiring additional weather stations to adequately monitor all areas of concern. These siting protocols ensure sufficient data granularity to provide SDG&E clear knowledge of the local weather conditions in its service territory. This data informs day-to-day operational decision-making at all levels of the Company to enhance situational awareness and mitigate the risks associated with wildfires and other adverse weather conditions. Additionally, the SDG&E weather station network supports SDG&E's Community Fire Safety Program and SDG&E strategic initiatives. SDG&E's weather station network is set forth in Appendix D.

SDG&E's weather data is available to all SDG&E employees, weather agencies, fire agencies, educational facilities, and the general public. There are a number of locations and applications where the data may be viewed, including the publicly available SDG&E Weather Awareness System at: http://sdgeweather.com. This site includes graphical images to visualize data and links to additional data, camera sites, and forecasts, and is scalable for a variety of devices, including tablet or hand-held.

The SDG&E weather network will continue to evolve in the years to come to maintain effective situational awareness and data quality. As the region faces the impacts of a changing climate, plans are being made to expand the weather network into high-impact wildland urban interfaces where more extreme weather and fire conditions may occur. Strategic weather station relocations are also planned to account for changes on the landscape and an increased understanding of climatological wind patterns in the SDG&E service territory.

4.5.2.3 Meteorology High-Performance Computing Program

SDG&E owns four high-performance computing clusters that are used to generate high quality weather data that is incorporated directly into operations. Collectively, nearly 2,000 compute core hours of high-performance computing are used per day to generate operational products, including the SAWTI, FPI, and WRRM-Ops. The forecast data generated by the supercomputers is shared with several partners, including the U.S. Forest Service, who disseminate the data through their public website, and the National Weather Service.

SDG&E plans to continue the production of forecast products into the foreseeable future. As science evolves and new technologies become available, SDG&E will use its computing clusters to integrate the new methodologies in order to maintain forecast reliability and situational awareness.

4.5.3 Fire Potential Index

The FPI was developed by SDG&E subject matter experts to communicate the wildfire potential on any given day to promote safe and reliable operations. This seven-day forecast product, which is produced daily, classifies the fire potential based on weather and fuels conditions and historical fire occurrences within each of SDG&E's eight operating districts. This is also shared with local fire agencies, emergency responders, and the National Weather Service.

The FPI reflects key variables, such as the state of seasonal grasses across the service territory (green-up), fuels (ratio of dead fuel moisture component to live fuel moisture component), and weather (sustained wind speed and dew point depression). Each of these variables is assigned a numeric value and those individual numeric values are summed to generate a fire potential value from zero (0) to seventeen (17), each of which expresses the degree of fire threat expected for each of the seven days included in the forecast. The numeric values are classified as "normal," "elevated," and "extreme." Further detail on the various FPI components is provided in Appendix E.

The FPI development team, consisting of SDG&E meteorologists and fire coordinators, has validated the FPI values and its usefulness by recreating historical values dating back to 2002. The historical results bore a very strong correlation to actual fire events in terms of the severity of past fires and, in particular, provided very accurate information as to when the risks of uncontrolled and large-scale fires were high. SDG&E expects to tie proactive and reactive operational practices and measures to the FPI values, with the further expectation that SDG&E will be able to reduce the likelihood its facilities and operations will be the source of ignition for a fire during times when the risk of fire as measured by the FPI elevated or extreme.

Moving forward, SDG&E will continue enhancing the predictors that contribute to the FPI, including live fuel moisture and green-up, to modernize the data inputs and better leverage the high-performance computing environment.

4.5.4 Santa Ana Wildfire Threat Index

SDG&E, the U. S. Department of Agriculture, the U.S. Forest Service, and the University of California Los Angeles (UCLA), in collaboration with CalFire, the Desert Research Institute, and the National Weather Service unveiled a web-based tool in September 2014 to classify the fire threat potential associated with the Santa Ana winds that are directly linked to the largest and most destructive wildfires in Southern California. The SAWTI categorizes Santa Ana winds based on anticipated fire potential and uses several meteorological and fuel moisture variables generated from the Weather Research and Forecasting (WRF) Model to forecast the index out to 6 days.[69] In addition to the index, a 30-year climatology of weather and fuels has been developed to help put current and future events into perspective.
The SAWTI calculates the potential for large wildfire activity based on the strength, extent, and duration of the wind, dryness of the air, dryness of the vegetation, and greenness of the grasses. Similar to the hurricane-rating system (category 1-5), the SAWTI compares current environmental data to climatological data and correlates it with historical wildfires to rate the

[69] The SAWTI is depicted in Appendix F.

Santa Ana wind event on a scale from “marginal” to “extreme.” To help the region prepare for hazardous conditions, information from the SAWTI is issued daily to fire agencies and other first-responders, which has led to specific preparedness and operational decisions based on the likelihood of a catastrophic wildfire fueled by Santa Ana winds. The public also has access to SAWTI to make personal safety decisions.

SDG&E is committed to maintaining the data flow used in SAWTI production for the U.S. Forest Service, who now issues this product daily. As technologies in weather forecasting and fuels predictions evolve, the new science will be integrated into operations to support the ongoing production of SAWTI.

4.5.5 Wildfire Risk Reduction Model – Operational System

Significant intel related to the wildfire potential is also gathered from SDG&E’s WRRM-Ops, which integrates the latest weather and GIS technology to understand wildfire growth patterns across the region (running 6,000 fire growth simulations per second on SDG&E’s super-computer and able to simulate 10 million fires in a single night). WRRM-Ops assesses the areas of highest fire danger before a wildfire begins so preventative measures can be taken to enhance public safety and ensure the reliable operation of the electric system. This model uses simulations generated from weather conditions, historical fire and outage history, and vegetation data to evaluate the wildfire risk within the SDG&E service territory.

WRRM-Ops is also able to simulate the growth and potential impact of a wildfire anywhere in the SDG&E service territory should an ignition begin. Integrating all of the aforementioned weather data developed by SDG&E, the WRRM-Ops model can conduct an analysis to determine the immediate threats, enabling quick decision making to help decrease the impacts of wildfire.

In 2019, this technology will be enhanced by migrating a fully operational version of the application to a cloud hosted environment, enabling SDG&E to operate this model through native mobile applications built for its subject matter experts and leadership. SDG&E is developing the capability to simulate wildfire growth and conduct vulnerability assessments from the field while responding to a wildfire incident.

4.5.6 Camera Networks and Fire Detection

Currently, SDG&E utilizes a total of 107 cameras that enhance situational awareness around wildfire. Twenty of these cameras are owned by SDG&E, while 87 cameras are supported by SDG&E in collaboration with UCSD as part of the High Performance Wireless Research and Education Network (HPWREN). Of these 87 cameras, 72 are static and 16 are high-definition pan-tilt-zoom “Alert SDG&E Cameras,” which are capable of remote directional and zoom control.

The Alert SDG&E Camera network is a state-of-the-art camera network designed to monitor wildfire activity and enhance situational awareness for SDG&E and its first responders and the communities they serve. SDG&E partnered with UCSD and the University of Nevada to deploy this network of 16 live-stream pan-tilt-zoom mountaintop cameras, which allows for quicker identification and triangulation of wildfires. Alert SDG&E Cameras are heavily used by CalFire’s

Monte Vista Dispatch Center to aid in better locating and sizing up wildfires for initial attack prior to the arrival of first responders.

SDG&E will maintain a close working relationship with UCSD in the years to come, supporting the HPWREN program and the evolution of the situational awareness cameras across the region for all wildfire community stakeholders and residents.

4.6 Climate Change Adaptation

Between January 1st and December 16th of 2018, 6,266 fires were reported by CalFire across the state of California with a burn area totaling 876,131 acres. This is a decrease of 16 fires during the same period in 2017, but an increase of 554,474 acres burned and stands at 111% and 375% of the 5-year averages of fires and acres burned, respectively.[70] While these numbers are exacerbated by dry conditions produced by well-below average rainfall statewide during the winter of 2017-2018, data ranging back to 1984 across San Diego County confirms that the number of high fire potential days each year has increased since the early 2000s. These trends are projected to continue as a combination of factors leads to increases in both fire season duration and severity through the end of the century.[71]

A 2013 study by the National Oceanic and Atmospheric Administration (NOAA) National Environmental Satellite, Data, and Information Service (NESDIS) group found that the effects of climate change will not significantly alter the frequency of Santa Ana wind events, which typically occur 2-5 days per month between October and March and have contributed to the growth of several of the largest wildfires in Southern California history. However, due to overall warming across the region, Santa Ana winds are likely to bring higher temperatures and lower humidity that will increase the fire potential with each event.[72] Because Santa Ana wind events typically deliver the warmest conditions to the coastal communities, increases in fire potential may also extend to the coastal canyons and wildland urban interface areas that historically have not been as high of a wildfire concern. The warmer temperatures are also expected to enhance evaporation and transpiration even outside of Santa Ana events, which will deplete fuel moistures at faster rates. When coupled with longer dry periods, increases in tree mortality due to drought, and increased warmth, this will result in longer fire seasons across the Southwest.

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[70] CalFire Incident Information: Number of Fires and Acres. http://cdfdata.fire.ca.gov/incidents/incidents_stats?year=2018.

[71] Melillo et al. 2014: *Climate Change Impacts in the United States: The Third National Climate Assessment.* U.S. Global Change Research Program, 841 pp. doi:10.930/J0Z31WJ2; Kent 2015: *Climate Change and Fire in the Southwest.* ERI Working Paper No. 34. Ecological Restoration Institute and Southwest Fire Science Consortium, Northern Arizona University: Flagstaff, AZ. 6 pp. http://swfireconsortium.org/wp-content/uploads/2015/06/Yocom_Climate_Fire_SW.pdf; CEP (Climate Education Partners) 2014: *San Diego, 2050 is Calling.* http://www.sandiego.edu/2050/.

[72] Kunkel et al. 2013: *Regional Climate Trends and Scenarios for the U.S. National Climate Assessment*. Part 5. Climate of the Southwest U.S., NOAA Technical Report NESDIS 142-5, 79 pp.

San Diego Foundation/SCRIPPS projects that in 2050 there will be longer and more extreme fire seasons and by 2100 the probability of large fires in Southern California could increase by 30%. Though the general consensus is that fire seasons will lengthen and become more severe through the coming century, there are still several unknowns that may alter fire behavior including shifts in vegetation type and the rebound rates of fuels in burned areas.[73] It has been suggested that some vegetation types will be unable to adapt to the temperature increases, which would initially lead to an ample supply of dead fuels to carry fire but would eventually result in a decline in fuels coverage unless the vegetation was phased out by species more apt to handle the hotter temperatures.[74] In addition, assuming the fires fully consume the fuels, increases in fire activity will eventually become limited until enough vegetation can grow back to support fire growth.[75]

4.6.1 Operational Response

4.6.1.1 Operating Conditions

The forecasts provided by the SDG&E Meteorology team, including the FPI, inform the operating condition used by SDG&E's electric system operators. There are four Operating Conditions used for these purposes, Normal, Elevated, Extreme, and Red Flag Warning, which are described in Section 4.1.1 above as well as in Appendix C.

The daily weather forecast, and Operating Condition are broadcast Company-wide by electronic media enabling all personnel whose activities are affected by the declaration of the operating condition to take action – the forecast, particularly when the threat of fire is high or rising, will be updated and rebroadcast as conditions warrant and as the staff meteorologists determine is appropriate. The forecast is broadcast in real-time to a large audience of SDG&E employees. Personnel receiving these weather forecasts are trained to adjust their activities, duties, and priorities based upon the Operating Condition reported by the staff meteorologists.

Generally, as actual or forecasted wind speeds measured in terms of both sustained winds (the average wind speed across ten-minute intervals) and wind gusts (the highest wind speed occurring during a three-second period within a ten-minute interval) increase, the operating condition will change (or be elevated), from "normal" to "elevated," or "extreme," or "red flag warning," depending on environmental and weather conditions and the strength of the winds being experienced or forecasted. With each step-change in the Operating Condition, personnel are placed on appropriate levels of alert. In addition, the level of system monitoring and, ultimately, system operations and activities, are elevated according to the prevailing Operating Condition. Most importantly, as wind speeds increase, SDG&E deploys an increasing number of field crews, troubleshooters, and wildland fire prevention resources to areas with the highest winds and where the greatest threat of fire exists, so as to increase the probability that the risk of an ignition will be minimized.

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[73] Kent 2015: *Climate Change and Fire in the Southwest.* ERI Working Paper No. 34; Westerling et al. 2006: *Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity.* Science, Vol. 313 no. 5789, pp. 940-943. doi:10.1126/science.1128834

[74] Kent 2015: *Climate Change and Fire in the Southwest.* ERI Working Paper No. 34.

[75] Kent 2015: *Climate Change and Fire in the Southwest.* ERI Working Paper No. 34.

4.6.2 Wireless Fault Indicators

The Wireless Fault Indicators program will install wireless fault indicators on SDG&E's electric distribution system. Wireless fault indicators are used to continuously monitor distribution circuits to locate faults more efficiently and accurately due to rapid pinpointing of line faults. When coupled with the On-Ramp Wireless system, the wireless fault indicator will communicate information to distribution system operators. This allows the operators to dispatch electric troubleshooters closer to the exact fault location, which supports quicker identification and isolation of the fault so that service restorations may begin. Wireless fault indicators provide detection and indication of electrical faults in the electric power distribution networks of the utility. Currently, the status of the indicators (tripped or reset) must be checked by visual inspection. This method takes a considerable amount of time as it involves driving to the field, patrolling the line to locate the tripped fault circuit indicator, and repairing the line. In addition, there is no way to validate that the existing indicator is working properly. The new wireless fault indicator employs wireless communications technologies to remotely monitor their status.

4.6.3 Advanced Weather Station Integration and Forecast

The Advanced Weather Station Integration and Forecast program seeks to further modernize the SDG&E weather network, which is currently the most granular, fully operational network of its kind anywhere in the country. This weather network brings superior situational awareness for the weather conditions impacting SDG&E's electric and gas system, supporting daily operations and emergency operations. The weather network also serves as a data foundation for high performance computer modeling which generates multiple analytical tools that are used across the organization. SDG&E's planned modifications to the system will include the replacement of aging sensors and equipment with the latest technology. This will include new thermometers, hygrometers, anemometers, batteries, solar panels, modems, and in some cases pyranometers. These actions will help ensure the weather network will continue running efficiently into the future.

The SDG&E weather network has become an integral aspect of the Community Fire Safety Program. The weather information is used to calibrate models such as the FPI and the SDG&E Outage Prediction Model which gives the Company the ability to anticipate when critical fire weather conditions or strong storms are approaching the area, allowing proactive preparedness measures to be taken. The weather network is also one of the primary pieces of intelligence that is used when, and if, the decision is made to de-energize portions of the electric system during times of critical fire weather conditions. In addition, this information is also shared with SDG&E's stakeholders. The typical lifespan of SDG&E's meteorological instrumentation is five to ten years. Proactive maintenance of SDG&E's weather network will be an important component for the future success of its Community Fire Safety Program.

4.7 Public Safety Power Shutoff Protocols

4.7.1 Strategy for Minimizing Public Safety Risk During High Wildfire Conditions

SDG&E has an obligation to operate its system safely. This obligation requires SDG&E to de-energize circuits (i.e., turn off power) when necessary to protect public safety (Public Safety Power Shutoff or PSPS). SDG&E is statutorily authorized to do so under P.U. Code §§ 399.2(a) and 451, consistent with D.12-04-024 and Commission Resolution ESRB-8. Any decision to de-energize circuits for public safety is made in consultation with SDG&E's Emergency Operations Center (EOC), Meteorology, and Electric System Operations leadership. Typically, it is expected, but not required, that the FPI would be "extreme" or there would be a "red flag warning" in effect when a PSPS decision is made.

Following any PSPS event, as specified in Resolution ESRB-8, SDG&E submits a report to SED within 10 business days after each de-energization event, as well as after high-threat events where notifications were provided to local government, agencies, and customers of possible de-energization though no de-energization occurred. Reports to SED include at a minimum the following information:

- The local communities' representatives contacted prior to de-energization, the date on which they were contacted, and whether the areas affected by the de-energization are classified as Zone 1, Tier 2, or Tier 3 as per the definition in GO 95, Rule 21.2-D.
- If not able to provide customers with notice at least 2 hours prior to the de-energization event, an explanation is provided in the report.
- The number and nature of complaints received as the result of the de-energization event and include claims that are filed against the IOU because of de-energization.
- A detailed description of the steps taken to restore power.
- The address of each community assistance location during a de-energization event, describe the location (in a building, a trailer, etc.), describe the assistance available at each location, and give the days and hours that it was open.

4.7.2 Public Safety Power Shutoff Protocols

A PSPS is a last resort measure to reduce wildfire risk. To that end, SDG&E takes great pride of the reliable service it provides to its customers. While the FPI and the National Weather Service's RFW declarations drive the Operating Condition, SDG&E considers a wide variety of inputs to determine whether to de-energize portions of its system. SDG&E leverages a multitude of situational awareness data and input from its subject matter experts when considering the need for a PSPS event, though experience with this program has indicated that it is not appropriate to use a prescriptive technique to determine when to use PSPS as wildfire conditions are dynamic and not every situation is the same. In determining whether to employ a PSPS in a given area of its system, SDG&E considers a variety of facts such as:

- Weather conditions
- Vegetation conditions
- Field observations
- Information from first responders

- Flying debris
- Meteorology
- Expected duration of conditions
- Location of any existing fires
- Wildfire activity in other parts of the state affecting resource availability

Utility operating experience is required to analyze all of the various inputs and make the decision how to manage risk to the communities affected.

4.7.3 Re-energization Protocols

If SDG&E determines it is necessary to employ a PSPS for portions of its system, re-energization will take place after the SDG&E Weather Network shows that wind speeds have decreased, and SDG&E weather forecasts indicate that winds will not re-accelerate above dangerous levels. All lines that have been de-energized are inspected for damage before re-energization may occur. Once a line is patrolled and any needed repairs are prioritized, the area may be re-energized in segments, leveraging the next open sectionalizing device to safely expedite the process.

4.7.4 Communication Practices

In advance of the peak of fire season, SDG&E will conduct ongoing education campaigns in five languages (English, Spanish, Chinese, Filipino, Vietnamese) regarding how to be prepared for emergencies in the event of a wildfire, natural disaster or major outage. This education campaign will also encourage customers to sign up for outage notifications, with the goal of raising awareness about SDG&E's PSPS procedures.

In the days leading up to a potential or imminent PSPS and during an active event, SDG&E establishes and maintains contact with customers that it believes may be impacted via various channels (use in-language where possible) communicating which Community Resource Centers are open and keeping the media and the public aware of the number of customers impacted and activities/restoration efforts by SDG&E crews. Key stakeholders, elected officials, and first responders are also communicated with through a variety of channels and personnel. SDG&E has specific teams or personnel assigned to directly contact local and state elected officials and critical customers, including water utilities and agencies affected by a PSPS. SDG&E's call center, social media, and website provide ongoing and available resources for communication and education for the overall customer base.

SDG&E monitors wildfire conditions seven to ten days ahead, providing forecasts to operational management and emergency operations staff so they have knowledge and time to prepare. Additionally, in certain extreme conditions, this advanced awareness is provided to key external stakeholders. If extreme fire weather conditions are forecasted and materializing, and the National Weather Service has the potential to issue a RFW, SDG&E begins to coordinate with local government agencies, community-based organizations, and emergency responders through its key account, company relations, and fire coordination teams. These SDG&E teams maintain contact throughout the event, providing updated information and a conduit for external stakeholders to communicate to SDG&E. SDG&E will also initiate proactive communication with customers through traditional methods and social media, driving traffic to

SDG&E's fire preparedness website https://www.sdge.com/wildfire-safety or https://sdgenews.com/ for more information. SDG&E's call center is also available to address customer questions and concerns.

SDG&E also proactively contacts customers with the potential to be affected by a PSPS upon the issuance of a RFW or extreme fire weather conditions. SDG&E contacts these customers directly, through its Enterprise Notification System (ENS), with a message to ensure they are aware. SDG&E's ENS sends outbound messages through phone, email, and text. These messages typically increase in urgency as the certainty of a PSPS approaches. SDG&E's social media accounts and its website are also updated with the latest information.

For medical baseline customers within an affected PSPS area, the ENS captures a positive physical response through the phone message when the customer is contacted. If no positive response is obtained, a second live attempt is made through SDG&E's call center to contact the medical baseline customer. If the second attempt fails, SDG&E will dispatch field personnel to deliver the message in person.

Critical customers,[76] such as health, water, communication, and education facilities within a potential PSPS area are also contacted through the ENS. Contact is also made through assigned SDG&E key account personnel. Notification will take place beforehand, so these customers can prepare and plan for a potential PSPS.

Moving forward, SDG&E will continue to integrate technology and data into the ENS in an effort to provide its customers with customized, timely, and precise information regarding SDG&E's Community Fire Safety Program. The customer notification processes have recently undergone significant refinement, which will continue as SDG&E receives feedback and lessons learned from PSPS events. Specific areas of focus will be an update to the base software of the ENS that will enhance SDG&E's ability to serve its customers by adding two-way texting capabilities and synching the ENS with our GIS and weather network to provide more targeted and timely alerting.

4.7.5 Mitigating the Public Safety Impact of PSPS Protocols

SDG&E manages and mitigates the impacts of a PSPS event through collaborations with key stakeholders in the wildfire response community. SDG&E has collaborated with approximately 40 stakeholders representing local schools, water districts, disability rights advocates, consumer groups, and fire departments.

SDG&E partners on a regular and ongoing basis with the following agencies to address a range of fire prevention and emergency activities:

- **San Diego County Fire Chiefs' Association** – provide monthly written and oral updates while encouraging feedback and comments on planning, response, recovery, and communications programs;

[76] Appendix G provides a listing of entities SDG&E considers to be priority essential services.

- **CalFire and the San Diego County Fire Authority** – engage in daily communications related to aerial firefighting and contract management of the year-round Aircrane program;
- **County Unified Disaster Council** – receive and provide quarterly updates on regional planning and response programs while building relationships with 18 cities, the County of San Diego, and participating Special Districts;
- **County Office of Emergency Services** – as needed, but no less than quarterly to discuss and agree on emergency planning, response, recovery, and communications needs;
- **All Fire Agencies in San Diego County** – including cities, fire districts, military, and tribal annually to provide in-service training on electric and natural gas safety, response, Incident Command integration with utilities, and communications to ensure response coordination during wildfire and other emergencies; and
- **Fire Dispatch Centers** – provide bi-annual communications training and requirements related to electric and natural gas incidents and emergencies.

SDG&E is and will continue to be a member of the California Utilities Emergency Association (CUEA), a collaboration between electric, natural gas, water, and telecommunications utilities in California. CUEA serves as a point of contact for critical infrastructure utilities and the California Office of Emergency Services and other governmental agencies before, during and after an event.

SDG&E has and continues to collaborate with UCSD on the development and maintenance of HPWREN, the UCSD partnership project led by the San Diego Supercomputer Center and the Scripps Institution of Oceanography's Institute of Geophysics and Planetary Physics, supporting internet-data applications in the research, education, and public safety realms. In addition to the camera network discussed in Section 4.5.6 above, SDG&E has also worked with UCSD to leverage HPWREN to provide internet connectivity to fire stations across remote portions of San Diego County. SDG&E will continue to collaborate with UCSD, investing in this critical communication backbone, providing resilient situational awareness, and communications during PSPS events.

In 2018, SDG&E held customer meetings with those affected by PSPS events to garner feedback on customers' thoughts and feelings before, during, and after a PSPS event. Overwhelmingly customers voiced a need to have a gathering place in the area affected that would be reasonably easy to get to and would have a place for them to charge cell phones and obtain current information about the PSPS event. By September 1, 2018, SDG&E, in working with the communities most affected, developed the concept of a Community Resource Center and located 9 centers in areas most likely to be affected by a PSPS. These centers offered affected customers a place to gather, charge cell phones, obtain current information and obtain things like bottled water, light snacks, and ice for temporary refrigeration. These centers were powered by portable generation provided by SDG&E and were in areas where there was not a reasonably close place to travel to where power was not shut off. This was highly successful and welcomed by affected customers. For 2019, SDG&E intends to examine the northern area of its service territory to determine where additional centers can be established. These centers would be similar to the ones in the south except for the need for generation as the

communities affected by PSPS events in the north are likely near areas that are not subjected to PSPS. In those cases, the centers would be opened primarily for cell phone charging and obtaining up to date information on the PSPS event.

SDG&E has also received feedback from residential customers impacted by PSPS events that the desire to obtain smaller generators for their homes but do not possess the financial capability to acquire one. Therefore, SDG&E is considering the potential of the creation of a Generator Grant Program (GGP), administered by a neutral third party, to grant residential customers the funding for the express need to acquire and be able to use a portable generator during outages, in particular PSPS events. SDG&E foresees the current greatest need to be in the residential customer grouping that is currently residing in the back country of San Diego, likely subject to a PSPS event, for example those customers currently under the medical base line tariff or who are dependent on well water. This program is currently in the conceptual phase and carries with it the need to identify all aspects of cost recovery.

4.8 Alternative Technology

Throughout this Plan, SDG&E identifies and discusses new technologies and strategies aimed at reducing the probability of an ignition event as well as minimizing public exposure to hazardous conditions during period of high fire risk. The relevant technologies that provide better situational awareness, faster isolation, or minimized energy transfer are discussed in Section 4.1.2, Section 4.3.2, Section 4.3.11, Section 4.3.14, Section 4.3.15, and Section 4.4.4.

4.9 Post Incident Activities

SDG&E's post-wildfire incident recovery, restoration, and remediations activities are discussed in detail in Section 5.2.1.6 below.

5 Emergency Preparedness and Response

5.1 Emergency Management

SDG&E manages emergencies in alignment with the state Standardized Emergency Management System (SEMS) and federal National Incident Management System (NIMS), to align across all levels of utility, government, and agency activity. The Company utilizes a utility-compatible Incident Command Structure (ICS) as an all-hazards framework to manage emergency incidents and events. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure and serves as the mechanism to direct those functions during an emergency response.

The SDG&E Emergency Management (EM) organization is responsible for coordinating emergency management activities and activation of the Emergency Operations Center (EOC). The department's mission is to support effective, efficient, and collaborative planning, preparedness, response, and recovery processes for all hazards and risks, including those associated with wildfire and RFW incidents enterprise-wide. EM's mission is accomplished through an integrated and collaborative approach including internal and external stakeholder

engagement, benchmarking, plan development, training, exercising, and a continuous quality assurance and improvement process via the after-action review (AAR) process.[77]

EM is comprised of four divisions: Emergency Services and Business Resumption (ESBR), Operational Field and Emergency Readiness (OFER), Aviation Services, and EM Information Technology (IT). The collective work of these groups consists of preparing for, responding to and recovering from incidents that may impact SDG&E operations.

5.1.1 SDG&E Emergency Operations Center

SDG&E's EOC serves as the location from which centralized emergency management is coordinated. To respond and recover effectively from all hazards and threats, like wildfires, SDG&E established an EOC with cross-functional teams representing every major business line within the Company and functions within a utility-compatible ICS. The activation of the EOC assembles the internal subject matter experts to assess and provide situational awareness to internal and external stakeholders, overarching incident objectives, planning, anticipation, response, communications, and coordination. External EM partners such as the County of San Diego Office of Emergency Services (OES) and California OES (Cal OES) are provided with situational awareness up 24-48 hours in advance or as soon as operationally feasible; additionally, those partners are embedded within SDG&E's EOC during emergency conditions.

5.2 Disaster and Emergency Preparedness Plan

5.2.1 Company Emergency Response Plan Overview

The Company Emergency Response Plan (CERP) and risk specific response plans provide a framework by which SDG&E can effectively coordinate the Company's pre-incident and response/recovery activities to a given threat or hazard. Pursuant to the CERP, the Utility Incident Commander or Officer-in-Charge (OIC), is ultimately responsible for incident management and support activities respectively. While a Utility Incident Commander or OIC may delegate authority, they cannot delegate the responsibilities outlined in the Wildfire Annex or the CERP.

5.2.1.1 Phases of Operation

There are three phases of emergency operations:

- **Pre-Incident:** Pre-incident planning activity in anticipation of an incident occurrence.
- **Response:** Period spanning from when the incident occurs, and a response team is stood up, until the response team has demobilized and transitioned operations to long-term recovery.
- **Recovery:** Spanning the period from when the response team has demobilized and transitioned to long-term recovery, until all recovery operations have been completed.

5.2.1.2 Incident Conditions

Certain fire-related criteria initiate SDG&E's notification process. The following are the criteria that triggers such communications:

[77] The AAR process is discussed in further detail in Section 5.2.1.6 below.

- Fires during an FPI of 14 or greater;
- Any uncontrolled fire within 1 mile of a transmission line;
- Any fire where SDG&E is potentially related to the cause regardless of the FPI;
- Any fire regardless of FPI that is:
    - Expected to escape initial attack/exceed 10 acres, or
    - Has impacted or may have a direct impact on any SDG&E facilities, or
    - Is expected to draw significant social or media attention

5.2.1.3 Pre-Incident Planning

Pre-incident planning is a key element in preparing for the risk of Wildfire and being able to react to an actual Wildfire. SDG&E must be aware of and be prepared to react to mitigate impacts from any wildfire within SDG&E's service territory. If SDG&E becomes aware of a potential incident expected to have adverse impacts on its system, Fire Coordination will consult with the SDG&E Meteorologists daily to come to agreement on fire potential and burning conditions based on the weather forecast, fuel conditions, current fire activity, availability of firefighting resources, and other relevant factors.

If an incident is anticipated, Emergency Management will begin to coordinate pre-incident activities with a day-ahead call focused on assessing real-time and forecasted weather conditions, operational resource needs and response plans, customer and stakeholder notification plans, EOC staffing needs and timing, and will provide projections for incident impacts. Proactive notifications are completed to customers and key external stakeholders during this phase of the response for incidents where there is advanced warning.

5.2.1.4 Response

Response to and during a wildfire requires immediate assessment and incident characterization, the communication of appropriate situational awareness and the development of an incident planning cycle to facilitate the collection, assessment and dissemination of relevant wildfire incident information. Should an ignition occur, a field Fire Coordinator will deploy to the jurisdictional fire agencies Incident Command Post (ICP) to provide real-time situational awareness to SDG&E. The Fire Coordinator serves as the agency liaison between first responder agencies and the SDG&E Utility Incident Commander. Field operations is responsible for scene safety, along with command and control of the incident to recover the system and restore customers. The EOC's focus is on the incident's "big picture," managing and deconflicting critical information, communicating to customers and key external stakeholders, and providing operational support and strategic and policy-level decision-making. De-mobilization planning remains a focus during the response phase to ensure adequate recovery of the system.

A wildfire may require de-energization of electric distribution circuit(s), and transmission tie line(s) for public or first responder safety. The OIC will carefully examine whether de-energization is required based on input from the field response and EOC responders, consistent with the PSPS protocols discussed in Section 4.7 above.

5.2.1.5 Crew Mobilization and Deployment Strategy

During an extreme operating condition or red flag warning condition, the management of the SDG&E Electric Regional Operations, Electric Distribution Operations and Electric Grid Operations control centers work in collaboration with SDG&E's Meteorology to coordinate the assignment of appropriate and needed resources to each of the affected regional operating districts. At minimum, electric troubleshooters and personnel from the Wildland Fire Prevention resources are made available for immediate response to address fire threats or events. If the event is more severe, additional resources will be coordinated and assigned to manage the event. Field personnel may be assigned to observe an area forecasted to experience the most adverse weather conditions – these personnel are under instructions to report flying debris, vegetation damage, or significant conductor movement. Based on these field observations, SDG&E deploys appropriate resources to address the fire threats posed by these conditions.

SDG&E has four mobile command trailers (MCT) and one new, state of the art, self-contained Tactical Command Vehicle (TCV), which provide a response space with land, mobile, radio, video, and internet capabilities. Additionally, four tactical communications trailers with internet capabilities are available to support the ICS structure during emergency response and restoration activities. During the high-risk fire season, these assets are staged in districts located within the HFTD. SDG&E's district personnel are trained annually on the assets operations and maintenance to ensure these assets remain effective and functional.

5.2.1.6 Recovery and Post Incident Activities

Recovery from a wildfire is just as important as the response to a wildfire. The location, extent, and severity of the wildfire and its impacts to SDG&E's infrastructure and customers are rigorously tracked, assessed, and prioritized to identify mitigation or improvement measures available when recovering for safe and swift restoration.

SDG&E continually reviews its program delivery, decision making processes, and responses to emergencies to ensure we can improve and better serve our customers. Through its Quality Assurance and AAR process, the planning, response, and recovery processes are evaluated across relevant internal response groups. Observations will address the following areas:

- Plan execution;
- Response structure;
- Activation and mobilization for the incident;
- Circumstances that contributed to, enhanced, or resulted in improvement opportunities in incident management or communications;
- Process execution and effectives;
- Communications strategy;
- Media interactions;
- Logistics support; and
- Financial tracking and support.

Based on lessons learned, emergency response plans are updated, processes and standards are enhanced, and training exercises are designed to stress test lessons learned and improvements

to support a continuously improved response. SDG&E will continue to review ongoing recovery operations and use its findings of post incident activities to drive improvements across the organization's resilience, response, and recovery programs.

5.2.2 Community Outreach and Public Awareness

SDG&E has created a multi-level approach to community education and outreach related to public awareness of fire threats, fire prevention, and emergency preparedness. Plans for community outreach and public awareness before, during, and after a wildfire, including language notification in English, Spanish, Chinese, Filipino, and Vietnamese, will be made where feasible. In-language communications will apply to videos, collateral, and print advertising before and after wildfires. These materials have previously educated customers about how to be prepared for wildfires and encouraged them to sign up for outage notifications and updates through SDG&E's My Account portal. SDG&E anticipates continuing this outreach messaging to further prepare customers for PSPS.

Notifications during wildfires are currently confined to English due to the language and translation limitations of SDG&E's current notification system. Messages in this system are also customized and recorded shortly before each event in many cases, and as such, providing additional in-language notifications in a timely manner are currently not feasible.

The key elements of SDG&E's multi-level approach to community education and outreach are described in further detail below.

5.2.2.1 Fire Safety Stakeholder Collaboration and Communication

In 2009, SDG&E customers and community leaders were invited to participate in a fire safety collaboration process, which was facilitated by a federal mediator. Approximately 40 stakeholders – representing various sections, such as local schools, water districts, disability rights advocates, consumer groups, and fire departments – worked with SDG&E for more than a year to develop a joint fire prevention plan. The process produced more than 100 potential solutions aimed at preventing the occurrence of major fires. SDG&E has implemented many of these solutions as identified by the stakeholders, including deactivating automatic reclosers, hardening its overhead electric system, replacing wood poles with stronger steel poles and larger conductors, and undergrounding portions of the electrical system, where feasible. As discussed in the following sections, SDG&E frequently invites community leaders, government agencies, and the public at-large to participate in a collaborative fire-safety process to continue dialogue and partnerships regarding public safety.

5.2.2.2 Partnering with Organizations Dedicated to Readiness and Response

SDG&E partners with approximately 98 non-profit organizations dedicated to readiness and response to wildfires and emergencies. SDG&E facilitates coordinated multi-agency preparedness, participates in the annual County of San Diego wildland drills, underwrites philanthropic grants to support San Diego County wildfire readiness, and works closely with media and key stakeholders to promote wildfire preparation initiatives in the San Diego region. SDG&E is a member of the CUEA, who serves as a point of contact for critical infrastructure utilities and the Cal OES and other governmental agencies before, during, and after an event.

5.2.2.3 First Responder Outreach Program

SDG&E works with local emergency response agency leadership to ensure continued awareness of electric and natural gas safety protocols and collaboration on roles and responsibilities for mutual emergency preparedness including, but not limited to wildfires. SDG&E works with all local, state, and federal fire agencies, regional dispatch centers, law enforcement and other emergency management partner agencies to ensure effective command, coordination, and communications in preparing for and responding to incidents. This is accomplished through training, exercises, relationship development and utilization of the Utility ICS.

5.2.2.4 Community Resource Centers

As a result of community meetings held in the most at-risk communities in SDG&E's service area, SDG&E established Community Resource Centers (CRCs) to help communities in real-time during extreme weather events. Currently, SDG&E has identified eight customer-owned facilities located within the HFTD to serve as CRCs during extreme weather events. SDG&E may establish more CRCs should the need arise.[78]

As discussed in Section 4.7.5, if SDG&E anticipates that power will be off for an extended period, CRCs may open in affected areas. The CRC locations selected by SDG&E were identified through a rigorous process, which included input from fire and meteorological experts, as well as consideration of those areas most prone to extreme weather, as indicated by historical data. The CRCs, if activated for a PSPS event that lasts longer than twenty-four hours in duration, will be powered using a portable back-up generator connected through a manual transfer switch. Once activated, the CRC will operate in roughly 10 hour shifts from 8:00am through 6:00pm daily, until power to the affected community has been restored. SDG&E subject matter experts will collaborate with volunteer staff at an activated CRC to provide, to the extent possible, updates and real-time information directly to the community impacted. Other volunteer organizations will provide bottled water and light snacks to provide temporary relief to residents in the area.

5.2.2.5 Community Outreach

SDG&E is proud to support non-profit organizations whose programs promote emergency preparedness and safety at home and in communities within its service territory. In 2012, SDG&E began providing funds to charitable organizations committed to regional and local emergency preparedness and fire safety, such as 2-1-1 San Diego, the American Red Cross, and the Burn Institute, plus several volunteer fire departments, CERTS, and Fire Safe Councils. In compliance with Resolution ESRB-8, SDG&E held a series of workshops regarding its PSPS practices. The purpose of these workshops was to educate stakeholders and obtain feedback from elected officials, community leaders, government agencies, and appropriate tribal organizations. SDG&E has incorporated much of the feedback into its public safety initiatives and continues to maintain an ongoing dialogue and partnerships with these stakeholders.

[78] Further information on CRCs may be found here: https://www.sdge.com/wildfire-safety/community-resource-centers.

5.2.2.6 Community Communication

SDG&E provides regular proactive communications to residents and businesses located in the HFTD. Aside from English and Spanish, communications material will also be produced in other languages, including Chinese, Filipino, and Vietnamese. These fire-safety and emergency communications include, but are not limited to:

- Community events, emergency preparedness workshops for businesses, public participation meetings, and backup generator safety workshops;
- Informational and emergency preparedness mailings to customers in the HFTD;
- Educational and general awareness advertising campaign focused on SDG&E's preparations for the fire season and the preparations SDG&E's customers should make to be ready for emergencies. This campaign includes a series of newspaper ads that run in community newspapers in the HFTD. SDG&E plans to run ads in Spanish, Chinese, Filipino (ads in English), and Vietnamese publications as well. These ads also encourage customers to sign up for outage notifications through the My Account portal;
- Educational information disseminated through a bill newsletter or special insert included in customer bills. An electronic version is emailed to paperless customers;
- Distribution of a co-branded "newsletter" with the American Red Cross, the San Diego Office of Emergency Services, and the San Diego County Fire Chiefs' Association;
- Distribution of a small "pocket-card," that easily folds and fits in an automobile glove box or emergency kit, which outlines how to be emergency-ready;
- Distribution of "refrigerator magnets" bearing important emergency information;
- The provision of weather information and system-outage status on SDGE.com;
- Dissemination of information regarding emergency-preparedness events via social media, such as Twitter and Facebook;
- Publication of information for SAFE San Diego Education and Outreach events in the community following an emergency.

In addition to routine outreach and communications, SDG&E augments its effort to communicate with customers when fire-threat conditions are elevated or extreme. SDG&E has instituted an early warning system advising customers that a RFW has been declared by the National Weather Service and dangerously high winds are expected. SDG&E also establishes communications with local water districts, telecommunications infrastructure providers, the San Diego County Office of Education, the San Diego County Office of Emergency Services, and the American Red Cross as soon as possible following the declaration of a RFW. SDG&E assembles a team of subject matter experts to provide updates on the status of the SDG&E system and weather conditions.

As alert conditions are elevated, SDG&E also contacts, directly and indirectly, Medical Baseline customers, including life support and temperature sensitive customers. Under severe threats of emergencies, where SDG&E cannot contact these customers via our outbound-dialer system,

SDG&E will send field personnel to make personal contact and, failing all else, to leave door hangers alerting the customer of the situation.

5.2.2.7 Emergency Preparedness Safety Website

SDG&E maintains a publicly accessible website focused on safety, including natural gas safety, electric safety, wildfire safety, tree safety, emergency preparedness, generator safety, and outage information, and can be found at http://www.sdge.com/safety. SDG&E's emergency preparedness brochures, traffic radio IDs, newspaper advertisements, digital ads, and social media postings via Facebook and Twitter, have been used to drive customers to the Company's wildfire safety section: http://www.sdge.com/wildfire-safety. Additional fire or weather-related webpages are actively maintained throughout the incident by SDG&E and are accessible using the following addresses:

- Weather web pages: http://sdgeweather.com
- Community Resource Centers: http://www.sdge.com/ resource-centers

5.2.3 Trained Workforce and Mutual Assistance

5.2.3.1 Employee Workforce and Training

SDG&E's approach to a trained workforce involves a three-pronged approach under the ICS framework, integrating training and exercises for field Utility Incident Commanders, EOC responders, and executives. Field operational responders are required to participate in Utility ICS training and required to follow Electric Standard Practice No. 113.1 (ESP 113.1), which specifically addresses wildland fire prevention and fire safety. The annual ICS training cycle of operational leaders, field responders, and supporting personnel includes cross-functional training workshops and exercises covering all-hazards as well as the deployment of field training advisors to ensure continuous improvement on practical application in the field. Additionally, SDG&E actively trains its own resources with the appropriate electric distribution and transmission operational skills. A summary of the types and numbers of SDG&E's current field resources is provided in Table 6 below.

Table 6: SDG&E Field Resources

Resource Type	Number	Description
Distribution Field Crews		
Journeyman Status ▪ Troubleman ▪ Working Foreman ▪ Journeyman	 42 35 164	Trained resources to work on SDG&E's high voltage, overhead and underground distribution system. They perform inspections and maintenance, assess system damages, make repairs to restore service, and serve as SDG&E's first responders.
Apprentice Lineman	39	Serve as compliments to field crews, training under the direct supervision of Journeyman Lineman and Working Foreman.
Line Assistants	12	Compliments the field crews as part of their training, working in direct supervision of the Journeyman Lineman and Working Foreman.
	(total: 292)	
Supervisors ▪ Construction ▪ Temporary	 27 8	Provides management, field safety, and operational oversight and technical support for field crews in each of SDG&E's nine districts.
	(total: 35)	
Transmission Field Crews		
▪ Journeyman ▪ Working Foreman ▪ Patrollers ▪ Wash Crews ▪ Line Assistant	10 4 2 2 1	Trained resources to work on SDG&E's transmission system, performing inspections and maintenance, assessing system damages, making repairs to restore service, and serving as SDG&E's first responders.
Construction Supervisor	5	Provides management, field safety, and operational oversight and technical support for field crews.
Trainer	1	Provides transmission-specific training to line crews.

SDG&E has a qualified EOC response workforce with over 450 Federal Emergency Management Agency-certified responders, equivalent to 10% of the total workforce. These responders are certified in the functions of ICS including command, operations, planning, logistics and finance. EOC responders, which include responder executives, are qualified annually in order to maintain their emergency response proficiency. Additionally, SDG&E's EOC collaborates annually with internal and external stakeholder organizations to conduct a Company-wide wildfire workshop, tabletop, functional or full-scale exercise prior to October, the beginning of fire season. Following the training and exercise, the EOC utilizes findings to develop an AAR to highlight positive response elements, areas for improvement, and corrective actions.

5.2.3.2 Fire Coordination

SDG&E employs a full-time staff of five fire coordinators. The current fire coordinators on staff have over 150 years of fire suppression, prevention, and fire behavior experience collectively. The fire coordinators serve as the direct link between SDG&E and emergency-response agencies. They also serve as SDG&E's single point of contact for fire agencies and utilize Incident Command System protocols during incidents, provide periodic updates to both firefighters and SDG&E personnel, establish radio and communications assignments, assist in the coordination of activities related to de-energizing and re-energizing power lines, and update on-scene personnel, control centers, service dispatch, and the SDG&E regional operations centers as to the status of each incident.

The Fire Coordinators are active in professional forums, seminars, and training throughout the service territory to ensure state-of-the-art fire practices are incorporated into SDG&E operations and practices. They also participate in engineering and operational meetings to advise SDG&E personnel regarding fire threats and prevention. The Fire Coordinators also share information with the firefighting agencies within the SDG&E service territory and, on a rotating basis, provide those agencies with electrical and gas safety training.

In addition, the Fire Coordinators provide wildfire prevention training to SDG&E personnel who work in wildland areas of the service territory. This annual training utilizes SDG&E's Electric Standard Practice No. 113.1 – Operations and Maintenance Wildland Fire Prevention Plan (ESP 113.1) to educate employees about the activities that present a risk of igniting a wildfire. The plan provides a fire risk and mitigation matrix based on work activity and the FPI to set a minimum level of requirements for fire prevention, work restrictions, and fire tools for suppressing small, witnessed ignitions. SDG&E requires that contractors and consultants also undergo wildland fire prevention training and that they follow SDG&E's ESP 113.1.

SDG&E Fire Coordination also participates in county-wide wildland fire drills that include electric utility scenarios, provide instructors for electric safety for CalFire's Truck Academy and the Heartland Firefighter Recruit Academy training.

5.2.3.3 Mutual Assistance and Contractors

Mutual assistance is an essential part of the energy industry's contingency planning and restoration process. Utility and electric service companies impacted by a major outage event are able, under mutual assistance, to augment the size of their workforce by 'borrowing' restoration workers form other companies. When called up, a utility company will send trained and qualified skilled restoration workers along with specialized equipment, oversight management and support personnel to assist the restoration efforts of a fellow utility/electric service company.

SDG&E is a member of multiple emergency associations to facilitate mutual assistance and maintains active mutual assistance agreements with the following organizations: California Utilities Emergency Association; Western Regional Mutual Assistance Group; Western Energy Institute; Edison Electric Institute; and the American Gas Association.

The decision to deploy a response team or request mutual assistance is facilitated by SDG&E Emergency Management group and determined by the OIC in consultation with key operations directors and executives.

5.3 Customer Support in Emergencies

SDG&E provides emergency residential and non-residential customer protections and available communications for wildfire victims, as ordered by the CPUC.[79]

SDG&E will post explanations of the protections offered to affected customers on a special landing page on SDGE.com, with a contact telephone number for more details of eligibility and protections available and promote the page with social media campaigns. In addition, SDG&E will make every effort possible to contact impacted customer to bring awareness to these protections. An Energy Service Specialist (ESS) or an account executive will make these calls. Finally, SDG&E will send an email to wildfire victims, for those customers who are identified with an email address.

5.3.1 Protocols for Compliance with Requirements to Support Customers

5.3.1.1 Customer Protections and Contact

Customers eligible for the wildfire residential and non-residential customer protections described below are those directly impacted by the fires and identified as such by SDG&E or who have self-reported as being impacted. Directly impacted customers would include those without electric service or those needing to re-locate (either temporarily or permanently) due to fire damage.

5.3.1.2 Description of Adopted Consumer Protections

The Commission in Resolution M-4835 required SDG&E to adopt certain residential and non-residential customer protections for December 2017 wildfire victims. These customer protections are described in the following sections and unless otherwise noted, each apply to both residential and non-residential customers.

5.3.1.3 Outage Reporting

Throughout the lifecycle of a potentially dangerous incident, it is important that the customer is adequately informed and prepared at all times. It is the responsibility of the SDG&E Customer Communication Center to ensure that this is the case.

SDG&E's omnichannel approach utilizing media, which includes but is not limited to: radio, newspapers, website, direct mail, and social media, provides a constant source of information that serves to educate its customers. All information is most readily accessible on the SDG&E website (sdge.com/sdgenews.com), which is available in both English and Spanish. The main areas of focus pertain to wildfire safety, emergency preparedness, PSPS, and emergency resource centers.

[79] Commission Resolution M-4835 (January 11, 2018). SDG&E filed Advice Letter 3177-E on January 26, 2018 in compliance with Resolution M-4835, which was made effective December 7, 2018.

After extreme fire weather conditions are forecasted and the National Weather Service potentially issues a RFW, SDG&E begins to coordinate with local government agencies, community-based organizations, and emergency responders. Proactive communications are then initiated with customers via SDG&E's ENS and social media driving traffic to SDG&E's fire preparedness website or sdgenews.com for more information. This information is also linked to a news center, managed by the media relations team, that runs a blog-style article of all the latest updates on the emergency. As the conditions persist and the likelihood of a PSPS event becomes more certain, the proactive communications to customers increase in urgency. The communications also become more specific to customers who are most likely to experience a PSPS.

5.3.1.4 Support for Low Income Customers/Medical Baseline

In support of customer protections pursuant to Commission Resolution M-4835, SDG&E takes the following actions for all low-income customers in the fire-impacted areas within SDG&E's service territory to align with the California Alternate Rate for Energy (CARE) and Energy Savings Assistance (ESA) programs as follows:

- Freeze all standard and high-usage reviews for CARE program eligibility standards and high-usage post enrollment verification (PEV) requests for all customers in the impacted areas within SDG&E's service territory.
- Partner with the United Way, the administrator of its Neighbor-to-Neighbor program that provides emergency bill assistance, to increase the bill assistance cap amount for impacted customers from $200 to $400.
- Modify the ESA program by allowing impacted customers to self-certify if: 1) the customer states they lost documentation necessary for income verification of a fire, or 2) if the customer states that individuals displaced by the wildfires reside in the household.
- Immediately following a fire, SDG&E deploys outreach representatives to the field to support American Red Cross and County of San Diego assistance centers. These outreach representatives help customers download the mobile outage map to stay up to date on estimated restoration times, promote and enroll them in programs like CARE and ESA and connect them to the vast array of services provided by San Diego emergency services.
- SDG&E also works with the local Community Based Organizations (CBOs) to help connect customers with emergency related information, outage information, and program information. These CBOs also help to refer customers in need to San Diego emergency services for further information and assistance. SDG&E will continue to work with the local CBOs to place an emphasis on the additional measures available to low-income customers.

In addition to the protections for the low-income customers discussed above, SDGE will freeze all recertification for medical baseline customers in the impacted areas within SDG&E's service territory.

5.3.1.5 Billing Adjustments

SDG&E will provide additional billing assistance for residential customers. Where the customer's residential structure has been destroyed, SDG&E will waive closing bills that include charges from the previous regular read date up until the dates the fires occurred, along with charges from the prior month of billing. For non-residential customers, where the structure has been destroyed, closing bill amounts from the previous regular read date up to the dates fires occurred will be waived. However, non-residential customers will be held responsible for charges billed for any months prior to the fires.

5.3.1.6 Deposit Waivers

SDG&E will waive deposit requirements for customers who are seeking to re-establish service at either the same location or a new location.

5.3.1.7 Extended Payment Plans

SDG&E will extend payment arrangements with a 0% down payment and offers a repayment period of 12 months to all impacted customers.

5.3.1.8 Suspension of Disconnection and Nonpayment Fees

For customers impacted by fires, SDG&E will suspend disconnection for non-payment and associated fees, waive the deposit and late fee requirements for affected customers who pay their utility bills late, and not report late payments by customers who are eligible for these protections to credit reporting agencies or to other such services.

SDG&E identifies the premises of customers impacted by the fires that are not capable of receiving utility services and discontinues billing these premises. SDG&E does not currently charge a disconnect charge, however, customers impacted by the fires will not be charged a reconnection charge, nor will a deposit be required.

5.3.1.9 Repair Processing and Timing (Move In – Move Out)

SDG&E initiates best efforts to expedite move-in and move-outs to support Californians returning to their homes and establishing service in new locations, and to monitor and track the time from when service requests are submitted to SDG&E to when services are provided to customers. If a customer advises SDG&E that they are relocating to another location due to the damage to their home, SDG&E will make every attempt to have service available to the customer on the requested day. Additionally, SDG&E will track the time from when the service is requested to the time it is completed.

5.3.1.10 Access to Utility Representatives

Customers and stakeholders have a variety of SDG&E representatives available to them to receive information and communicate concerns. These include: SDG&E's Call Centers, Regional Public Affairs, Customer Care – Key Accounts, and Fire Coordination.

- **Call Centers:** The call centers provide a way in which any customer, or concerned person, can contact SDG&E and obtain information before, during, or after an event.

SDG&E's call centers monitor events as they approach and adjust resource needs accordingly throughout the event.

- **Regional Public Affairs:** SDG&E has assigned specific people to develop and maintain relationships with local elected officials. As an event approaches, the SDG&E resource will establish and maintain contact with their key stakeholder. The SDG&E representative provides answers to questions and addresses concerns.
- **Customer Care – Key Accounts:** SDG&E has identified key and critical accounts for which it assigns a specific resource to establish and maintain contact during an event. The SDG&E representative reaches out to the customer as the event develops and maintains contact until the event is over.
- **Fire Coordination**: The Fire Coordinators are experienced in fire behavior, fire prevention, and firefighting techniques. The Fire Coordinators serve as the direct link between SDG&E and emergency-response agencies. They also serve as the single point of contact for the fire agency Incident Command System, provide periodic updates to fire emergency personnel and SDG&E personnel, establish radio and communications assignments, assist in the coordination of activities related to de-energizing and re-energizing power lines, and update on-scene personnel, control centers, service dispatch, and the SDG&E regional operations centers as to the status of each incident.

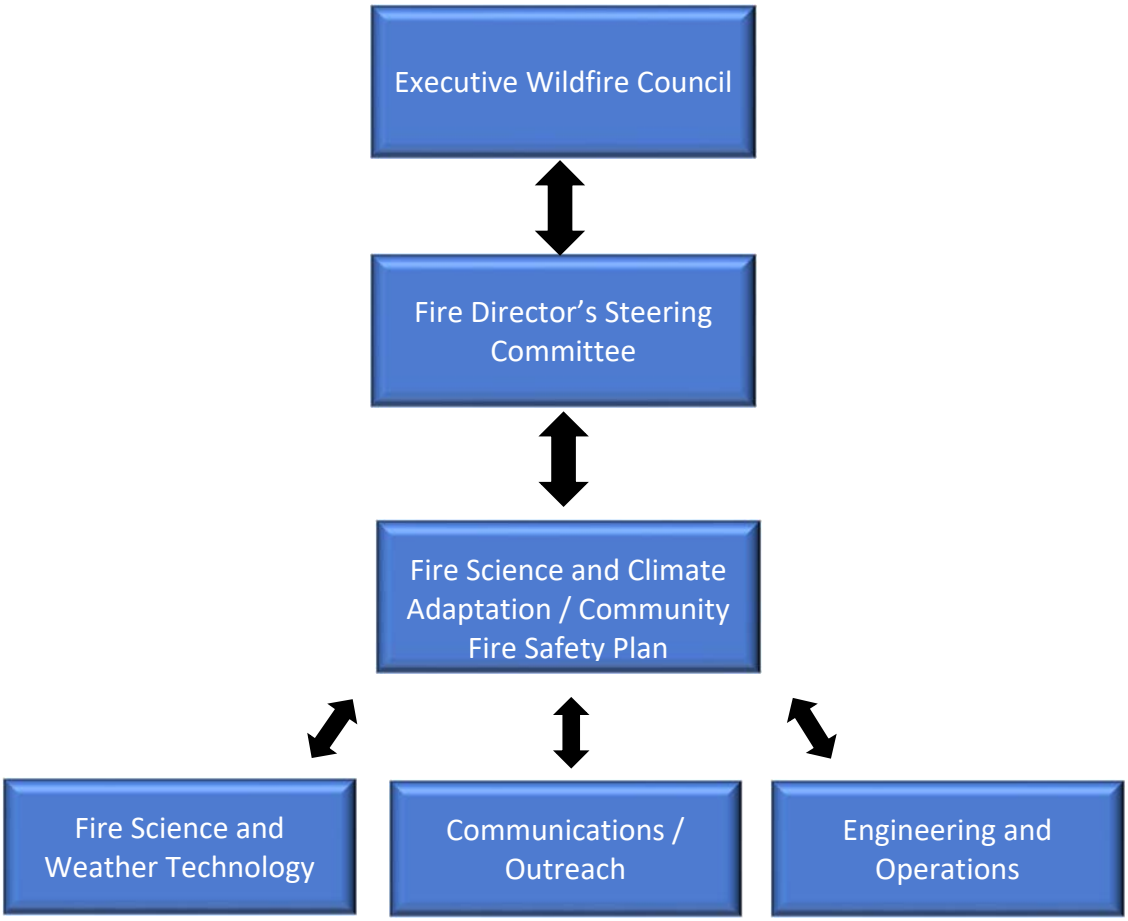
6 Performance Metrics and Monitoring

6.1 Plan Ownership and Execution

While the Director of the Fire Science & Climate Adaptation department (the wildfire risk manager) and the Vice President (VP) of Electric System Operations (the wildfire risk owner) have primary responsibility for owning, executing, and auditing this Plan, wildfire mitigation at SDG&E is a Company-wide, inter-departmental effort involving resources and programs across utility functions. As such, SDG&E has developed a cross-functional organization to govern the development and implementation of its wildfire mitigation strategy. Wildfire mitigation and response concepts and ideas can be originated and developed anywhere within SDG&E; however, their prioritization, resourcing, implementation, and tracking is governed by the Company's cross-functional organizations.

SDG&E's wildfire mitigation governance organization involves three teams and one functional department, each with specific responsibility to the successful development and implementation of the Company's wildfire mitigation strategy. Members of each team represent functions across the organization and range from executive-level to individual process or program owners and subject matter experts. The governance bodies include: Executive Wildfire Council, Fire Directors Steering Committee, Community Fire Safety Plan, and the Fire Science & Climate Adaption Department.

Figure 3: Wildfire Mitigation Governance Structure



6.1.1 Executive Wildfire Council

The Executive Wildfire Council establishes SDG&E's overall wildfire mitigation and response strategy. It assigns ownership and resources to support a coordinated, collaborative, and cross-functional approach to wildfire mitigation. The Executive Wildfire Council meets monthly to review SDG&E's overall performance in mitigating and responding to wildfires as well as to set Company strategy and prioritize resources.

The Executive Wildfire Council consists of the following SDG&E executives:

- President
- Chief Operations Officer (Host)
- Senior VP – Electric Operations
- VP – Electric System Operations
- VP – Electric Engineering & Construction
- VP – General Counsel
- VP – Enterprise Risk Management & Compliance
- VP – State Governmental Affairs & External Affairs

- VP – Customer Services
- VP – Regulatory Affairs
- Director – Fire Science & Climate Adaptation (Co-Host)

6.1.2 Fire Directors Steering Committee

The Fire Directors Steering Committee meets monthly and provides support, guidance, and oversight of SDG&E's wildfire mitigation and response programs established by the Executive Wildfire Council. The committee will also monitor the status and implementation of SDG&E's Wildfire Mitigation Plan and overall Community Fire Safety Program efforts being implemented and developed.

Members of the Fire Directors Steering Committee include:

- Director – Fire Science & Climate Adaptation (Host)
- Director – Emergency Management & Aviation
- Director – Electric Distribution Operations
- Director – Electric Grid Operations
- Director – Electric Engineering
- Director – Transmission & Substation Operations
- Director – Electric Regional Operations
- Director – Enterprise Risk Management
- Director – Asset Management
- Director – Regional Public Affairs
- Director – Marketing & Communications
- Director – Customer Care
- Assistant General Counsel/Senior Counsel
- Fire Mitigation & Climate Adaptation Manager (Co-Host)
- Quantitative Risk & Controls Manager
- Fire Coordination Manager
- Transmission Construction & Maintenance (TCM) Construction Operations Manager

6.1.3 Community Fire Safety Plan Committee

The Community Fire Safety Plan Committee is a group of managers, process owners, and subject matter experts who meet monthly and track the implementation of identified wildfire mitigation programs and processes. Members of this committee are responsible for the individual wildfire mitigation and response programs that make up the Community Fire Safety Plan.

Members of the Community Fire Safety Plan include:

- Fire Mitigation & Climate Adaptation Manager (Host)
- Fire Mitigation & Climate Adaptation Program Manager
- Fire Coordination Manager and support
- Meteorology Program Manager and support

- Quantitative Risk & Controls Manager and support
- Assistant General Counsel/Senior Counsel
- Marketing Communications Manager and support
- Communications Manager
- Customer Outreach & Engagement Supervisor
- Customer Programs Specialist
- Electric Engineering Team Lead and support
- Compliance Program Manager, Asset Management and support
- Construction Operations Manager TCM
- Vegetation & Pole Integrity Manager
- System Forester
- Emergency Operations Program Advisor
- Electric Distribution Engineering Manager and support
- Electric Distribution Operations Team Lead and support
- Electric Engineering Principal Engineer
- Manager – Transmission & Distribution Assets and support
- Compliance Management Manager & Technical Advisor

6.1.4 Fire Science and Climate Adaptation

A large part of being prepared for and mitigating the threat of fire is recognizing the fact of environmental and situational evolutions. The SDG&E service territory, along with the entire region, has experienced drought, sporadic precipitation, and increased tree mortality which compound the severity of and threat of the potential for a wildfire ignition. In recognition of these changing conditions and the constant need to adapt, SDG&E took a leap forward in restructuring resources to form a department, Fire Science and Climate Adaptation (FS&CA), which is comprised of meteorologists, community resiliency experts, fire coordinators, and project management personnel. Established in the second quarter of 2018, the department currently consists of 14 employees under the direction of the Director of FS&CA and maintains the sole purpose of responding to and strategizing for the ever-changing utility industry's fire preparedness activities and programs.

6.1.5 Wildfire Mitigation Plan Accountability and Ownership

The FS&CA department, led by the Director of FS&CA, is responsible for managing the production, compilation, and finalization of SDG&E's annual Wildfire Mitigation Plan to reflect the planned activities to comply with the requirements of P.U. Code § 8386(c).

The VP of Electric System Operations owns wildfire risk and ultimately has responsibility and accountability for the successful execution of SDG&E's Wildfire Mitigation Plan. The Executive Wildfire Council, described in Section 6.1.1 above, will use the process described above, involving the Fire Directors Steering Committee, the Community Fire Safety Plan, and the FS&CA department to oversee the execution of the Wildfire Mitigation Plan.

6.2 Metrics to Evaluate Plan Performance

As required by P.U. Code § 8386(c)(4), SDG&E includes the following metrics that are intended to enable the Commission to evaluate compliance with this Plan. Substantial compliance with the metrics set forth in the final Plan (once approved by the Commission) should demonstrate that SDG&E acted prudently and met the Commission's "reasonable manager" standard, in regard to wildfire risk mitigation. However, events outside of SDG&E's control, such as skilled labor resource constraints, supply chain disruptions, or permitting and construction delays, could restrict SDG&E's ability to meet all of the approved metrics, and should be viewed by the Commission in context when completing its subsequent compliance evaluation.

In this section, SDG&E offers metrics to use to evaluate its Plan's performance. These metrics are presented below consistent with the three-prong approach discussed in Section 2 above of Operations and Engineering; Situational Awareness and Weather Technology; and Customer Outreach and Education. For each of the three prongs, SDG&E presents metrics for each of the Plan's identified preventive strategies and/or programs put forth in Sections 4 and 5 (e.g., Operational Practices, System Hardening).

The target for a given metric is critically important to accurately evaluate the item of measure. To that end, SDG&E believes that the unit of measure for metrics should be clear and understandable without requiring a substantial explanation. For example, if two additional weather stations are proposed to be installed, how would one know if that was a significant addition? SDG&E contends that a more meaningful measurement would include informational data to provide context of how many weather stations are currently installed in its service territory and/or provide a target that demonstrates SDG&E has substantially complied with the Plan. The concept of substantial compliance is to determine if the results of a metric are consistent with expectations as communicated in the Plan given that each year differs based on a variety of factors, such as weather patterns. SDG&E will evaluate its metrics relative to its forecast (i.e., cost and number of widget estimates) and will strive to establish trends overtime.

Each metric alone does not necessarily imply that SDG&E's Plan is or is not successful. Rather, the metric should be viewed collectively to demonstrate that progress has been made in the respective areas and the data is moving in the right direction.

SDG&E recognizes that there are many metric-related efforts underway in other proceedings before the CPUC. For example, there is a specific Metrics Working Group led by the CPUC's Safety and Enforcement Division ongoing in the S-MAP.[80] SDG&E will incorporate metrics from other proceedings, as necessary and appropriate. Given that metrics are an evolving area of interest, SDG&E looks forward to working with stakeholders to further discuss relevant metrics.

[80] A.15-05-002 (cons.).

6.2.1 Operations and Engineering Metrics

6.2.1.1 Operational and Engineering Practices

Metric: Percentage of reclosers that protect the HFTD that are disabled during elevated or extreme FPI conditions.

Target: 95-100%.

As discussed Section 4.1.2, reclosers are utilized to allow SDG&E to (1) operate its system to incorporate input from its meteorologists, known localized conditions, and its declared Operating Conditions; and (2) sectionalize elements of its distribution system. This is a new metric for SDG&E. Rather than measure this metric as a snapshot in time, SDG&E suggests that this metric be measured over the compliance period of this Plan.

6.2.1.2 Inspection Plan

Metric: Percentage of inspections completed pursuant to GO 165 within a 12-month period.

Target: 95-100%.

As discussed Section 4.2.1.1, SDG&E inspects its electric distribution system according to CPUC GO 165. SDG&E's CMP is a significant mitigation for wildfire risk given SDG&E's large presence of electric distribution infrastructure. CMP is a robust inspection program that includes higher risk overhead distribution infrastructure in the HFTD. SDG&E performs overhead visual inspections on a five-year cycle. SDG&E also performs a patrol inspection annually across its entire service territory.

This metric illustrates SDG&E's productivity and effectiveness with regards to SDG&E's performance and management with its CMP. The data for this metric is readily available and is intended to be measured as of December 31 of each year.

6.2.1.3 System Hardening Plan

Metric: Number of miles system hardened in the HFTD.

Target: 90-100%.

As discussed Section 4.3, SDG&E has numerous programs either underway or in development to strengthen and modernize its system. This metric is intended to be an index of the major programs discussed in Section 4.3, which includes the Cleveland National Forecast, FiRM, and PRiME programs. These three programs form the core of SDG&E's fire hardening plans as they focus on high risk equipment in the HFTD, reducing the chances of an ignition in the areas where an ignition would be the most devastating.

The overall progress for the metric will be equally weighted between all three programs, and measured as:

- FiRM: % of system miles hardened compared to Plan's assumptions (weighted 33%)
- CNF: % of system miles hardened compared to Plan's assumptions (weighted 33%)
- PRiME: % of poles replaced compared to Plan's assumptions (weighted 33%)

While this is data that SDG&E is currently collecting, it may or may not be used for this specific purpose. Therefore, as a multitude of programs, this is a new metric for SDG&E. SDG&E proposes to measure this metric as of December 31 of each year. This metric is an execution metric, that will measure SDG&E's adherence to the approved Plan, measuring actual miles hardened and poles replaced against the level ranges stated in in Appendix A for these programs.

6.2.1.4 Vegetation Management Plan

Metric: Percentage of vegetation inspections completed in the HFTD.

Target: 95-100%.

As discussed Section 4.4, SDG&E has designed and maintains its robust vegetation management program aimed at keeping trees and brush clear of electrical infrastructure. SDG&E considers this to be a critical program targeted to mitigate the risk driver of vegetation contact. SDG&E has existing metrics related to vegetation management. That said, SDG&E is proposing this metric specifically for the purpose of evaluating this Plan's performance. SDG&E proposes to measure this metric over the compliance period of this Plan.

The inspection activity for this metric will include the assessment of all trees in the HFTD that are within the strike zone of the electric facilities that may impact the lines by encroachment and/or limb or complete tree failure per GO 95, Rule 35 and PRC § 4293. In addition to this inspection, SDG&E plans to perform a second patrol within the entire HFTD during each calendar year of the Plan following the same criteria as above. The metric measure for these activities will be line miles completed and will be documented via line mapping and the Vegetation Management tree inventory electronic database.

6.2.1.5 Public Safety Power Shutoff Protocols

Metric: Percentage of PSPS impacted metered customers notified of the potential PSPS in advance.

Target: 90-100%.

As discussed Section 4.7, SDG&E de-energizes circuits when necessary to protect public safety in certain circumstances. PSPS is one tool SDG&E uses as a last resort to mitigate wildfire risk. SDG&E believes that the intent behind this metric is to provide its customers with the most accurate information possible before a PSPS event occurs, enabling customers to anticipate and prepare for the event. For purposes of this metric, "in advance" refers to any reasonable amount of time prior to the de-energization of the impacted circuit. "Notified" in the context of measuring this metric refers to SDG&E using the customer's preferred communication channel, as stated to SDG&E, to communicate the potential for a PSPS event for which they will be impacted. While PSPS is not a new tool for SDG&E, this metric does not exist for SDG&E today. Further, SDG&E does not currently collect the data required to measure this metric. SDG&E plans to measure this metric over the compliance period of the Plan.

6.2.1.6 Alternative Technologies

Refer to Section 6.2.1.3 regarding System Hardening Plan.

6.2.1.7 Post Incident Recovery, Restoration, and Remediation Activities

Refer to Section 6.2.1 regarding Operations and Engineering as well as Section 6.2.3 Customer Outreach and Education.

6.2.2 Situational Awareness and Weather Technology

6.2.2.1 Situational Awareness and Determination of Local Conditions

Metric: Percentage of weather stations operational during RFW or extreme FPI.

Target: 95-100%.

SDG&E has installed weather stations throughout its service territory with a particular focus on the HFTD. The weather stations are intended to enable SDG&E to monitor weather conditions in near real-time on every distribution circuit and transmission line across the fire-prone areas of the SDG&E service territory to monitor the severity of the fire weather conditions. SDG&E believes this is a critical tool to help mitigate the risk of wildfire because this data informs day-to-day operational decision-making at all levels of the Company, including Electric Distribution, Transmission, and Emergency Operations to enhance situational awareness and mitigate the risks associated with wildfires and other adverse weather conditions. Although weather stations are of critical importance, like many other technology, issues arise. This is a new metric that SDG&E has developed for the purpose of evaluating the Plan's performance and SDG&E's situational awareness. SDG&E is currently collecting the data necessary for this metric. SDG&E plans to measure this metric over the compliance period of the Plan.

6.2.2.2 Situational Awareness Tools

Metric: Percentage of business days annually that the FPI is published.

Target: 95-100%.

The FPI is an internally developed, seven day forecast tool that is intended to reflect the potential for large wildfire across the SDG&E service territory on any given day based on weather and fuels conditions and historical fire occurrences within each of SDG&E's eight operating districts. The situational awareness provided by the FPI is a foundational component of this Plan and informs the operations and maintenance of the electric system 365 days a year. Although SDG&E has the data to produce this metric, this is a new metric for SDG&E. SDG&E proposes that this metric be evaluated over the compliance period of the Plan.

Metric: Percentage of days annually that the WRRM-Ops model is functional during elevated or extreme FPI Conditions.

Target: 95-100%

The WRRM-Ops model assesses the areas of highest fire danger before a wildfire begins so preventative measures can be taken to enhance public safety and maintain reliable operation of the electric system. WRRM-Ops is also able to simulate the growth and potential impact of a wildfire anywhere in the SDG&E service territory should an ignition begin. This technology and enhanced situational awareness is foundational to SDG&E's ability to anticipate, prepare for, react to, and recover from wildfire events impacting our service territory. Through this metric,

SDG&E is intending to show that this mitigation tool is able to support emergency operations at all times a wildfire may occur.

SDG&E currently tracks and has access to the data required for this metric. That said, this is a new metric for SDG&E. SDG&E recommends that this metric be evaluated over the compliance period of the Plan.

6.2.3 Customer Outreach and Education

6.2.3.1 Emergency Management

Metric: Percentage of SDG&E's EOC responders that are trained in ICS.

Target: 95-100%.

As discussed in Section 5.1, SDG&E utilizes an Incident Command Structure to manage emergency incidents and events. ICS is an essential element within the nationally recognized SEMS and is the framework for responding to and managing emergencies and disaster involving multiple jurisdictions and agencies. SDG&E utilizes ICS to standardize all elements of its response structure so that it may be consistently translated to and easily understood by internal and external partners and stakeholder agencies to respond in an effective and integrated manner to all hazards. Due to the importance of ICS, SDG&E requires all EOC responders trained in ICS.

Beginning primarily in 2018, SDG&E collects the data that will be used to compute this metric; however, this is a new metric developed for evaluating the Plan's performance. SDG&E suggests evaluating this metric as of December 31 of each year.

6.2.3.2 Disaster and Emergency Preparedness

Metric: Number of internal and external emergency response preparedness trainings conducted.

Target: 95-100%.

SDG&E applies a comprehensive approach to emergency response and preparedness. This includes annual trainings, workshops, and exercises with internal and external stakeholders. Examples of such trainings are EOC and field leadership ICS training and table top exercises. The training cycle and emergency responder participants may vary from year-to-year. In fact, many of the trainings are based on two-year cycles. Accordingly, the number of trainings may also vary in a given year. Further, through SDG&E's After-Action Review Process, SDG&E measures effectiveness through continuous improvement and tracking of corrective actions.

To determine the progress for this metric, SDG&E plans to measure the percentage of trainings conducted compared to the Plan's assumptions. The Plan's assumptions, as expressed in ranges, are provided in Appendix A. SDG&E plans to evaluate this metric as of December 31 of each year.

Metric: Percentage of fire agencies in the SDG&E service territory that receive hazard training, including fire.

Target: 95-100%.

As addressed in Section 5.2, SDG&E coordinates and trains local first responders, including all 54 fire agencies in its service territory. This is largely accomplished through SDG&E's First Responder Outreach Program. As part of this program to date, 100% of local fire agencies in San Diego County have participated in utility safety trainings, emergency preparedness briefings, and contingency planning exercises. The same opportunities are made available to other first responder agencies and stakeholders such as local law enforcement and government. This metric is intended to demonstrate the extensive efforts undertaken by SDG&E to partner with other key stakeholders in its service territory. SDG&E currently tracks and measures liaison activities in compliance with P.U. Code § 965.5, 49 CFR 192.615, and GO 112-F. SDG&E proposes to evaluate the metric over the compliance period of this Plan.

6.2.3.3 Customer Support During Emergencies

Refer to Section 6.2.1.5 regarding PSPS advanced notifications.

6.3 Application of Previously Identified Metrics to Inform Plan

As part of its annual GO 166 FPP effort, SDG&E previously developed two metrics to evaluate its Fire Prevention Plan performance: CPUC Reportable Ignitions, and Transmission and Distribution Wires Down. These metrics, along with SDG&E's history of wildfire mitigation and response, have informed the development of this Plan by allowing SDG&E to gain experience with tracking fire-relevant data and subsequently developing and planning new metrics. SDG&E's initial metrics were developed to focus on fire ignitions and physical incidents that could be the precursor to an ignition (e.g., wires down).

SDG&E does not recommend that these initial metrics be used to determine compliance with this Plan as they are not controllable. Subsequent metrics presented in this Plan should track data that may be used to directly or indirectly measure effectiveness of SDG&E's fire prevention, mitigation, and response program impacts. For example, as explained above, tracking the number of miles system hardened is presented to measure aspects of SDG&E's fire prevention and mitigation efforts. SDG&E intends to collectively review a portfolio of metrics data over time and believes, as this data is collected, it will prove useful to SDG&E and stakeholders to show progress and trends.

As SDG&E's wildfire mitigation, prevention and response continues to evolve, and additional potential metrics are evaluated, updates may be integrated.

6.3.1 CPUC Reportable Ignitions

CPUC reportable ignitions, as defined in D.14-02-015, are associated with electric overhead powerlines anywhere in the SDG&E service territory. In 2017, there were 23 reportable fires in SDG&E's service territory that met the D.14-02-015 definition. Of these 23, 7 were contained to less than 10 acres and the remaining 16 were contained to less than one quarter of an acre. In 2018, there were a total of 26 reportable fires, all of which were contained to less than 100

acres, 24 of the 26 were contained to less than 10 acres, and 21 of the 26 contained to less than 0.25 acres.

6.3.1.1 Transmission and Distribution Wires Down

Transmission and Distribution Wires Down are the number of electric transmission and distribution wires downed within SDG&E's HFTD. The data used for this metric is the number of instances where an electric transmission or primary distribution conductor falls to the ground or on to a foreign object (within the SDG&E HFTD). For 2017, SDG&E had 47 such instances within the HFTD. In 2018, SDG&E had 41 wire-down events in the HFTD.

6.4 Process and Procedure Descriptions

6.4.1 Monitoring and Correcting Deficiencies

The owners of this Plan described in Section 6.1 above will execute, monitor, review, and address deficiencies in SDG&E's approach to wildfires. The structure is integrated both across the entire SDG&E organization as well as through its reporting hierarchy. With regular monthly meetings of each group, this structure allows for wide collaboration and information gathering, as well as the ability to inform, plan, act, and improve within a compressed timeline, when needed. This structure will also allow any operational or strategic changes to be communicated and captured within SDG&E's approach to wildfire mitigation and response.

In 2018, SDG&E created a new group in the FS&CA department to closely monitor the Community Fire Safety Plan and this Plan. This monitoring and continuous improvement process for wildfires at SDG&E can start with any employee or any one of the three groups involved in the governance structure, though this newly formed group, Fire Mitigation and Climate Adaptation, will monitor and track this Plan implementation with the Community Fire Safety Plan. This group meets monthly to review the implementation status of wildfire mitigation and emergency management initiatives as well as to monitor the Plan's performance against metrics. The Community Fire Safety Plan will report the status, including variances, of SDG&E's performance to the Fire Directors Steering Committee.

The Fire Directors Steering Committee will discuss and create plans to address any variances against the Plan, as well as to discuss any new ideas or strategies that could be immediately assigned and implemented. The members of the Fire Directors Steering Committee will implement any necessary corrections or adjustments within existing operational and budgetary constraints. It will also report the status, plans, and variances to the Executive Wildfire Council. The Fire Directors Steering Committee will also make recommendations or request additional funding or resources to address existing variances.

The Executive Wildfire Council will address strategic considerations and guide the organization to address wildfire mitigation efforts efficiently.

7 Additional Information Required by the CPUC

7.1 Cost Information

In response to the ALJ Ruling, SDG&E has also included in Appendix A, "cost estimates for each activity in the WMP in order for the Commission to weigh the potential cost implications of measures proposed in the plans." SDG&E has included transmission-related activities in this Plan pursuant to the ALJ Ruling,[81] however, because these activities are regulated by the Federal Energy Regulatory Commission, SDG&E has only included cost estimates for those activities that are CPUC jurisdictional.

SDG&E presents its cost estimates in direct dollars, in 2019 dollars given that this Plan is being filed in 2019 for mitigation activities planned for 2019. Further, consistent with SDG&E's presentation in its 2016 RAMP Report and 2019 GRC workpapers, the cost estimates are provided in ranges of dollars and shown separately for Operations and Maintenance (O&M) and capital expenditures. These cost estimates will be further refined both in future RAMP and GRC filings and represent SDG&E's current knowledge at a snapshot in time. To the extent that conditions change, the cost estimates put forth herein may be updated in future filings.

SDG&E is presenting O&M cost estimates in this Plan relative to its 2018 authorized revenue requirement, which was established in the 2016 GRC and approved by the CPUC in D.16-06-054. The basis for presenting costs in this Plan compared to SDG&E's 2018 authorized revenue requirement is that it is consistent with P.U. Code § 8386(j), which requires SDG&E to track costs incurred for fire risk mitigation that are not otherwise covered in SDG&E's revenue requirements. This approach is also consistent with the table included in Appendix B of the ALJ Ruling, specifically the column requesting "Costs Currently in Revenue Requirement."

For SDG&E, 2018 revenue requirement is what is implemented in rates as of the date of this Plan. The 2018 revenue requirement was only intended to be in rates through December 31, 2018, however, SDG&E's TY 2019 GRC, which requested its new revenue requirement be effective on January 1, 2019 is still pending. Since SDG&E is awaiting the outcome of its 2019 GRC, no revenue requirement has been authorized by the CPUC.

Additionally, SDG&E is presenting O&M cost estimates in this Plan on an incremental basis to 2018 authorized revenue requirement. SDG&E's O&M is presented in the GRC as one or more cost centers summarized in a workpaper or work group. While these O&M workpapers are comprised of various components, such as activities, labor, and non-labor, not all activities are presented in the GRC in that granular manner. Therefore, identifying the annual costs associated with a particular activity embedded in base business workpapers is challenging and would require further assumptions.

Capital, however, is being presented in this Plan as the entire cost, not just incremental, of the program for each year of the compliance period, which SDG&E is proposing to be through 2020. SDG&E forecasts capital for multiple years leading up to and including the test year in its GRCs and as the total direct cost of the program. However, SDG&E generally manages capital over a GRC cycle. Therefore, capital shown in this Plan is consistent with the GRC presentation. Since

[81] ALJ Ruling at 2.

projects generally span several years, considering capital costs over a limited timeframe (e.g., one year) typically does not represent the entire mitigation.

In addition, costs for these mitigation activities will be converted into revenue requirement when recording costs to any authorized memorandum account(s) and at the time SDG&E seeks cost recovery in a future GRC or other applicable proceeding(s). While cost estimates provided in the Plan represent forecasts, actual revenue requirement will be recorded to memorandum accounts.

Many (but not all) of the programs and activities described in this Plan have been included in and will be funded through SDG&E's GRC rates. However, the Commission has not yet issued a decision in SDG&E's pending 2019 GRC (A.17-10-007), which was filed on October 6, 2017, and as such SDG&E does not know at this time what funding will be authorized.

There may be programs in the Plan for which SDG&E has revised its assumptions and cost forecasts compared to the 2019 GRC. In such instances, SDG&E reiterates that GRCs are generally managed over the cycle and, especially as it related to capital, projects take time to ramp up to the GRC levels. This is particularly true given the uncertainty associated with the timeliness and outcome of a GRC decision. SDG&E also believes that wildfire-related risk mitigation activities and spending will be reviewed through the requirements set forth in D.14-12-025 for Accountability Reporting.

While SDG&E has included preliminary cost estimate ranges, as required, both SB 901 and the OIR make clear that this proceeding, and the Plan itself, are not cost recovery exercises. Instead, pursuant to the statute, SDG&E will track the costs for the programs and activities detailed throughout this Plan, and in the future seek recovery for any incremental costs in the appropriate procedural forum. For cost recovery purposes, demonstrating substantial compliance with the Commission-approved Plan requirements should facilitate the Commission's subsequent just and reasonable review.

7.2 Comparison of Wildfire Mitigation Plan and Fire Prevention Plan

This 2019 Wildfire Mitigation Plan is similar to SDG&E's prior FPPs in that both describe SDG&E's overall fire mitigation plan and the various programs and initiatives that are currently in place. Both describe SDG&E's three prong approach to wildfire mitigation under the general areas of: operations and engineering, situational awareness and weather technology, and customer outreach and education. Both describe the weather awareness system that SDG&E has developed and uses, as well as the tools that are in place to improve situational awareness and provide real-time monitoring of fire potential and fuel conditions. Both describe the types of system hardening programs that are in place, the parameters SDG&E operates from during various levels of weather extremes, and how SDG&E contacts and educates its various customer groups.

This Plan, however, has been expanded to comply with the numerous specific requirements in SB 901.[82] These requirements include, among other things, a discussion on risk elements identified, the strategies that SDG&E has employed (or plans to employ) to further mitigate the potential of an ignition source associated with electric facilities, cost estimates of those mitigations, the inclusion of metrics designed to measure the completeness of the various stated programs and initiatives, a discussion on SDG&E's overall emergency preparedness and response programs, and an explanation on Plan governance and oversight. For the 2019-2020 period, this Plan includes and describes new wildfire mitigation strategies and programs that were not included in the FPP. These are summarized below.

For Operations and Engineering, SDG&E intends to:

- Implement a comprehensive fuels management program with the goal of protecting communities and electric facilities;
- Collaborate with agency stakeholders to find the best solution to provide GIS data;
- Accelerate its FiRM and PRiME programs to increase the overall hardening of the electric system;
- Establish programs to replace expulsion fuses and remove hotline clamps;
- Develop and implement an asset management program to meet stakeholder and regulatory requirements found in ISO 55000;
- Initiate the WiSE program to mitigate risk by hardening electric distribution overhead infrastructure and protection systems in wildland urban interfaces;
- Evaluate and update covered conductor projects on FiRM planned for 2020;
- Deploy LTE using a dedicated radio frequency (RF) spectrum to improve the overall reliability of SDG&E's communication network;
- Re-examine and expand the current vegetation management database to improve patrols and pruning requirements; and
- Enhance vegetation management program by increased inspections, patrols, and trimming.

In the area of Situational Awareness and Weather Technology, SDG&E intends to:

- Rebuild and update 60 of its weather stations with the latest technology in key locations;
- Develop predictive indicators to support SDG&E's vegetation management program through the use of big data analytics;
- Mobilize and cloud base the WRRM-Ops model to provide SDG&E's fire coordinators with the ability to simulate current conditions in the field so that it can be examined by decision makers in the Emergency Operations Center during critical times;
- Enhance the FPI and add additional cameras to the system to provide for greater and more specific coverage in weather prone areas;

[82] Because the WMP requirements are more extensive than the FPP's, SDG&E believes that the FPP requirement will become redundant and the Commission should consider eliminating it once the WMPs are approved.

- Operationalize the daily weather briefing into an app so that it can be easily obtained in the field;
- Acquire a second firefighting helicopter for dispatch by CalFire for active firefighting and patrolling of electric lines when needed; and
- Continue an Ignition Management Program (IMP) to track ignitions and potential ignitions, and perform root cause analysis on each ignition or potential ignition to detect patterns or correlations.

For Customer Outreach and Education, SDG&E plans to:

- Improve community outreach and education by adding additional Community Resource Centers for use during PSPS events;
- Target fire stations in the backcountry and work to secure internet communication and camera access for them during a PSPS events; and
- Implement a Backup Power for Resilience project, which will provide back-up power to critical infrastructure (i.e., fire stations, Community Resource Centers, and other critical infrastructure).

Appendix A

Workpapers to SDG&E's Wildfire Mitigation Plan

Consistent with the ALJ Ruling, for each identified preventative strategy or program in Section 4 of this Plan, the workpapers in this Appendix provide detailed information on: (1) whether the program/strategy is existing or new; (2) if existing, the proceeding where the program/strategy costs have been subjected to Commission review; (3) if new, identification of any memorandum account where related costs are being tracked and an explanation of how double tracking is prevented; (4) whether the program/strategy is implemented in compliance with existing regulations or exceeds current regulatory requirements; (5) if a program/strategy is identified as meeting a current regulatory requirement, a citation to the associated order, rule, or code; (6) a description of how the implementation of the program/strategy mitigates one or more of the wildfire risks or drivers identified in the Plan. Additionally, each of the identified preventive strategies and programs is delineated into one of the following categories: (1) Design and Construction, (2) Inspection and Maintenance, (3) Operational Practices, (4) Situational/Conditional Awareness, and (5) Response and Recovery.

In response to the ALJ Ruling, SDG&E has also included in this Appendix, "cost estimates for each activity in the WMP in order for the Commission to weigh the potential cost implications of measures proposed in the plans." SDG&E has included transmission-related activities in this Plan pursuant to the ALJ Ruling, however, because these activities are regulated by the Federal Energy Regulatory Commission, SDG&E has only included cost estimates for those activities that are CPUC jurisdictional.

SDG&E presents its cost estimates in direct dollars, in 2019 dollars given that this Plan is being filed in 2019 for mitigation activities planned for 2019. Further, consistent with SDG&E's presentation in its 2016 RAMP Report and 2019 GRC workpapers, the cost estimates are provided in ranges of dollars and shown separately for Operations and Maintenance (O&M) and capital expenditures. These cost estimates will be further refined both in future RAMP and GRC filings and represent SDG&E's current knowledge at a snapshot in time. To the extent that conditions change, the cost estimates put forth herein may be updated in future filings.

SDG&E is presenting O&M cost estimates in this Plan relative to its 2018 authorized revenue requirement, which was established in the 2016 GRC and approved by the CPUC in D.16-06-054. The basis for presenting costs in this Plan compared to SDG&E's 2018 authorized revenue requirement is that it is consistent with P.U. Code § 8386(j), which requires SDG&E to track costs incurred for fire risk mitigation that are not otherwise covered in SDG&E's revenue requirements.

Response to Change in Operating Conditions

Plan Cross-Reference: Section 4.1.1

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Response to change in Operating Conditions is an existing strategy.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by changing how SDG&E operates (i.e., enabling or disabling reclosing, enabling or disabling sensitive protection settings, limiting or not limiting certain construction activities) to reduce the risk of creating an ignition during periods of elevated, extreme, and Red Flag Warning conditions.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This strategy was included in the Design, Operations and Maintenance mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-15 at SDGE 15-10 – SDGE 15-11).

Costs: The job activities described in this strategy are performed on a day to day basis by multiple work groups. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its Fire Risk Mitigation Memorandum Account (FRMMA), which is pending before the CPUC in Advice Letter 3333-E, to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Recloser Protocols

Plan Cross-Reference: Section 4.1.2

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Recloser Protocols is an existing strategy.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by disabling reclosing and enabling sensitive relay settings that can both more easily detect faults and trip faster when a fault is detected, limiting the fault energy. Both features when enabled during high risk operating conditions reduce the chance of ignitions.

This falls under the Operation Practices mitigation category.

RAMP: This strategy was included in the Design, Operations and Maintenance mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-15 at SDGE 15-10 – SDGE 15-11).

Costs: The job activities described in this strategy are performed on a day to day basis by multiple work groups. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Other Special Work Procedures

Plan Cross-Reference: Section 4.1.3

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Other Special Work Procedures is an existing strategy.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by restricting certain high-risk construction activities within the HFTD during elevated or higher operating conditions.

This falls under the Operational Practices mitigation category.

RAMP: This strategy was included in the Design, Operations and Maintenance mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-15 at SDGE 15-10 – SDGE 15-11).

Costs: The job activities described in this strategy are performed on a day to day basis by multiple work groups. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Wildfire Infrastructure Protection Teams (Contract Fire Resources)

Plan Cross-Reference: Section 4.1.4.1

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: Wildfire Infrastructure Protection Teams (Contract Fire Resources) is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by providing fire suppression capability proximate to SDG&E work or operational activities during extreme weather events.

This falls under the Response and Recovery mitigation category.

RAMP: This program was included in the Rapid Response mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015 at Chapter SDG&E-1 at SDGE 1-15).

Costs: Costs for this program were approved in D.16-06-054 for the 2016 GRC cycle. While there are forecasted costs for this program requested and pending before the CPUC in A.17-10-007, in this Plan this program has been expanded beyond the levels in A.17-10-007.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Wildfire Infrastructure Protection Teams (Contract Fire Resources)	**2019**		**2020**	
	Low	High	Low	High
Incremental O&M (Directs, 2019$ in MM)	$0.7	$1.1	$0.7	$1.1

Aviation Firefighting Program

Plan Cross-Reference: Section 4.1.4.2

Objective Time Frame: This program that will continue over the compliance period of this Plan.

New/Existing: The aviation firefighting is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by providing aerial firefighting capability throughout SDG&E's service territory and beyond.

This falls under the Response and Recovery mitigation category.

RAMP: This program was included in the Rapid Response mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015 at Chapter SDG&E-1 at SDGE 1-15).

Costs: Certain costs for this program were approved in D.16-06-054 for the 2016 GRC cycle. Forecasted costs to expand this program for the 2019 GRC cycle were requested and are pending before the CPUC in A.17-10-007. However, in this Plan SDG&E is proposing to expand its Aviation Firefighting Program beyond the levels in A.17-10-007.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Aviation Firefighting Program	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Incremental O&M (Directs, 2019$ in MM)	$6.0	$9.0	$6.0	$9.0

Industrial Fire Brigade

Plan Cross-Reference: Section 4.1.4.3

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: The Industrial Fire Brigade is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by being available full-time to fight fires involving electrical equipment and flammable liquids.

This falls under the Response and Recovery mitigation category.

RAMP: This program was included in the Rapid Response mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015 at Chapter SDG&E-1 at SDGE 1-15).

Costs: Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Ignition Management Program

Plan Cross-Reference: Section 4.1.4.5

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: The Ignition Management Program is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the harmful impacts of wildfires on both electric infrastructure and fire prone communities, regardless of the cause of the ignition of those fires.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: It was not presented in SDG&E's 2016 RAMP Report.

Costs: SDG&E plans to utilize current resources within the Emergency Management work group to fund the job activities discussed in this program. Accordingly, SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Fuel Management Program

Plan Cross-Reference: Section 4.1.4.6

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: The Fuel Management Program is a new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program will mitigate the harmful impacts of wildfires on both electric infrastructure and fire prone communities, regardless of the cause of the ignition of those fires.

This falls under the Inspection and Maintenance mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: This program is being presented for the first time in this Plan. It is SDG&E's intent to record costs for this program in the FRMMA for evaluation at a later time.

Fuel Management Program	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Incremental O&M (Directs, 2019$ in MM)	$0.4	$0.6	$0.7	$0.9

Distribution System Inspection

Plan Cross-Reference: Section 4.2.1

Objective Time Frame: This an ongoing program that will continue over the compliance period of this Plan.

New/Existing: Distribution System Inspection is an existing program, and includes SDG&E's Corrective Maintenance Program inspections, Quality Assurance and Quality Control inspections, and Monitoring and Auditing process.

Meet or Exceed Regulations: SDG&E's Corrective Maintenance Program inspections meet the regulatory requirements of GO 165. SDG&E's Quality Control inspections meet and exceed the GO 165 requirements.

Risk Mitigation: This program mitigates the risk of wildfire by inspecting SDG&E facilities to identify nonconformances that could lead to equipment failures before they occur. Preventing equipment failure within the HFTD reduces the risk of ignitions caused by equipment failure.

This falls under the Inspection and Maintenance mitigation category.

RAMP: This program was included in the Inspection, Repair, Maintenance & Replacement Programs mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-13 – 1-14, SDGE 1-16; Chapter SDG&E-15 SDGE 15-10 – SDGE 15-11).

Costs: The job activities described in this inspection program are performed on a day to day basis by multiple work groups. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this program.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Substation System Inspection

Plan Cross-Reference: Section 4.2.2

Objective Time Frame: This an ongoing program that will continue over the compliance period of this Plan.

New/Existing: Substation System Inspection is an existing program.

Meet or Exceed Regulations: This program meets the regulatory requirements of GO 174.

Risk Mitigation: This program mitigates the risk of wildfire by inspecting SDG&E facilities to identify nonconformances that could lead to equipment failures before they occur. Preventing equipment failure within the HFTD reduces the risk of ignitions caused by equipment failure.

This falls under the Inspection and Maintenance mitigation category.

RAMP: This program was included in the Design, Operations and Maintenance mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-15 at SDGE 15-10 – SDGE 15-11).

Costs: The job activities described in this inspection program are performed on a day to day basis by the Substation Construction and Maintenance work group. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this program.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Transmission System Inspection

Plan Cross-Reference: Section 4.2.3

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: Transmission System Inspection is an existing program.

Meet or Exceed Regulations: This program meets the requirements of the maintenance plan filed with CAISO. Lines are inspected to ensure conformance with California Public Resources Code (PRC) §§ 4292 and 4293, as well as GO 95 and GO 128 rules.

Risk Mitigation: This program mitigates the risk of wildfire by inspecting SDG&E facilities to identify nonconformances that could lead to equipment failures before they occur. Preventing equipment failure within the HFTD reduces the risk of ignitions caused by equipment failure.

This falls under the Inspection and Maintenance mitigation category.

RAMP: This program was included in the Design, Operations and Maintenance mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-15 at SDGE 15-10 – SDGE 15-11).

Costs: Costs for this program are O&M expenditures related to SDG&E's transmission system and not CPUC jurisdictional. These costs will be recovered through SDG&E's Transmission Owner (TO) 5 formula rate case filed with the Federal Energy Regulatory Commission (FERC).

Geographic Information Systems Data

Plan Cross-Reference: Section 4.2.4

Objective Time Frame: This is program that will continue over the compliance period of this Plan.

New/Existing: Geographic Information Systems Data is a new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by sharing GIS information with other agencies and stakeholders to improve collaboration and overall emergency event response.

This falls under the Response and Recovery mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: SDG&E plans to utilize current resources to fund the job activities discussed in this program. Accordingly, SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Design and Construction Standards

Plan Cross-Reference: Section 4.3.1

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Design and Construction Standards is an existing strategy. The Design and Construction Standards described in this strategy have already been completed and take input from multiple work groups to publish. However, SDG&E is constantly striving to improve through new methods or technologies to mitigate risk. The development of the covered conductor standards described in Section 4.3.14 is an example of this.

Meet or Exceed Regulations: This strategy meets and exceeds the requirements of GO 95 by leveraging SDG&E's extensive weather network to design to known local conditions based on SDG&E's wind map. While GO 95 requires utilities to design to "known local conditions," it does not require utilities to have the weather network in place to identify the known local conditions. This strategy also meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by establishing design criteria that will withstand the extreme weather condition brought on by Santa Ana winds within the HFTD.

This falls under the Design and Construction mitigation category.

RAMP: This strategy was included in the Design and Engineering Approaches mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: Costs for performing the updating and creation of standards were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Testing and Deploying Emerging Technologies

Plan Cross-Reference: Section 4.3.2

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Testing and Deploying Emerging Technologies is an existing strategy.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by looking for new technologies to deploy such as the CalFire approved fuse (discussed in Section 4.3.11), and the falling conductor protection technology (discussed in Section 4.3.15) that reduce the risk of ignitions within the HFTD.

This falls under the Design and Construction mitigation category.

RAMP: Testing and Deploying Emerging Technologies was not presented in SDG&E's 2016 RAMP Report as a specific strategy. However, programs such as Fire Threat Zone Advanced Protection which developed from this strategy were presented in the 2016 RAMP Report.

Costs: The job activities described in this strategy are performed on a day to day basis by the Distribution Engineering work group. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Facility Analysis

Plan Cross-Reference: Section 4.3.3

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: Facility analysis is an existing program.

Meet or Exceed Regulations: This program exceeds regulations as these are not part of the GO 165 inspection plan filed with the CPUC. These inspections utilize multiple data sources including outage information and LiDAR in addition to what is identified with visual inspections to assess the risk of a facility.

Risk Mitigation: This program mitigates the risk of wildfire by analyzing SDG&E facilities to identify facility locations that have a higher probability of failure based on engineering data and outage history. This information is used by capital programs, such as FiRM and PRiME, along with other tools to prioritize replacements.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This program was included in the System Modernization mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-12 at SDGE 12-14).

Costs: The job activities described in this program are performed on a day to day basis by multiple work groups. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this program.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Oversight of Activities in the Rural Areas

Plan Cross-Reference: Section 4.3.4

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Oversight of Activities in the Rural Areas is an existing strategy.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451, as there is no regulatory requirement to have an oversight team evaluate proposed mitigations within the HFTD.

Risk Mitigation: This strategy mitigates the risk of wildfire by creating an oversight team that evaluates the impact of the proposed mitigations to ensure the most critical wildfire risks are addressed.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: While not explicitly presented as a mitigation in the 2016 RAMP Report, this team developed many of the mitigations presented in the 2016 RAMP Report.

Costs: The job activities performed by this team occur on a day to day basis. The members represent and support multiple work groups. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this program.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Asset Management

Plan Cross-Reference: Section 4.3.5

Objective Time Frame: This new program will continue over the compliance period of this Plan.

New/Existing: Asset Management is a new program. The Asset Management work group is a new work group proposed in A.17-10-007. If authorized, it will perform the asset management work activities on an annual basis in an ongoing manner.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451 by developing and implementing an asset management program that conforms with ISO 55000, which is not required by regulation.

Risk Mitigation: This program mitigates the risk of wildfire by developing an asset health index for facilities located within the HFTD. Developing the asset health index will aid in prioritizing inspections, repairs, and replacements for at risk facilities.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This program was not presented in the 2016 RAMP Report, but was listed as a "RAMP Post-Filing" program in A.17-10-007.

Costs: Forecasted costs for this program were requested and are pending before the CPUC in A.17-10-007. It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Asset Management	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Incremental O&M (Directs, 2019$ in MM)	$1.2	$1.8	$1.7	$2.5

Overhead Transmission and Distribution Fire Hardening

Plan Cross-Reference: Section 4.3.6

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan. At the current rate, SDG&E plans to complete the wood to steel program by 2025.

New/Existing: Overhead Transmission and Distribution Fire Hardening is an existing program.

Meet or Exceed Regulations: This program meets and exceeds GO 95 requirements.

Risk Mitigation: This program mitigates the risk of wildfire by fire hardening transmission and distribution lines within the HFTD.

This falls under the Design and Construction mitigation category.

RAMP: This program was included in the Inspection, Repair, Maintenance & Replacement Programs mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-13 – SDGE 1-14).

Costs: Transmission costs for this program will be recovered through SDG&E's TO5 Formula Rate Case filed with FERC. Associated distribution costs, such as underbuilt distribution on the transmission lines or distribution lines identified as connected actions for transmission jobs, are included in SDG&E's GRC.

Associated distribution work was authorized in D.16-06-054 for the 2016 GRC cycle. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. It is SDG&E's intent to record the distribution-related costs associated with this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Overhead Transmission and Distribution Fire Hardening	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Capital (Directs, 2019$ in MM) (Distribution-related Only)	$4.4	$6.6	$3.9	$5.8
Incremental O&M (Directs, 2019$ in MM)	$0.09	$0.33	$0.08	$0.29

Underground Circuit Line Segments

Plan Cross-Reference: Section 4.3.7

Objective Time Frame: This new program will continue over the compliance period of this Plan. SDG&E plans to continue the 20D program as well as strategic undergrounding on an ongoing annual basis.

New/Existing: Underground Circuit Line Segments is a new program.

Meet or Exceed Regulations: This program meets the regulatory framework established in Tariff 20D.

Risk Mitigation: This program mitigates the risk of wildfire by undergrounding overhead lines, reducing the risk of ignitions.

This falls under the Design and Construction mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: This program is being presented for the first time in this Plan, as the 20D program was being established but had not been finalized when SDG&E filed A.17-10-007. Costs for this program will vary with the planned scope of work. It is SDG&E's intent to record costs for this program in the FRMMA for evaluation at a later time.

Underground Circuit Line Segments	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$1.2	$1.8	$4.9	$7.3

Cleveland National Forest Fire Hardening

Plan Cross-Reference: Section 4.3.8

Objective Time Frame: This is an existing program that will continue over the compliance period of this Plan. This program is planned to be completed by 2021.

Metric: Miles of circuits hardened.

New/Existing: Cleveland National Forest Fire Hardening is an existing program.

Meet or Exceed Regulations: This program meets and exceeds GO 95 requirements.

Risk Mitigation: This program mitigates the risk of wildfire by fire hardening transmission and distribution lines within the HFTD.

This falls under the Design and Construction mitigation category.

RAMP: This program was included in the Inspection, Repair, Maintenance & Replacement Programs mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-13 – SDGE 1-14).

Costs: Transmission costs for this program will be recovered through SDG&E's TO5 Formula Rate Case filed with FERC. Associated distribution costs, such as underbuilt distribution on the transmission lines or distribution lines identified as connected actions for transmission jobs, are included in SDG&E's GRC. Associated distribution work was authorized in D.16-06-054 for the 2016 GRC cycle. Forecasted costs are also pending before the CPUC in A.17-10-007 for the 2019 GRC cycle.

To the extent additional distribution-related costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Cleveland National Forest Fire Hardening	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM) (Distribution-related Only)	$47.7	$58.3	$55.8	$68.2
Incremental O&M (Directs, 2019$ in MM)	$0.95	$2.9	$1.1	$3.4
Miles of Transmission Circuits Hardened	25	31	27	33
Miles of Distribution Overhead Circuits Hardened (Excludes Transmission Underbuilt)	20	24	18	22
Miles of Distribution Overhead to Underground	15	19	4	6

Fire Risk Mitigation (FiRM)

Plan Cross-Reference: Section 4.3.9

Objective time frame: SDG&E is seeking approval for this existing program over the compliance period of this Plan. As stated in Section 4.3.9, the FiRM program plans to accelerate the amount of circuit mileage hardened per year to complete the program in seven years (2019-2025) from the originally planned twelve years.

Metric: Miles of Distribution circuit hardened.

New/Existing: FiRM is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451 by proactively targeting high risk conductor with known high failure rates and replacing them before they fail. The new construction meets and exceeds GO 95 requirements.

Risk Mitigation: This program mitigates the risk of wildfire by hardening the distribution system to known local wind conditions, reducing the risk of equipment failure in high wind. Additionally, the FiRM program installs high tensile strength conductors that are less likely to fail than the aged small wire that exists today.

This falls under the Design and Construction mitigation category.

RAMP: This program was included in the Inspection, Repair, Maintenance & Replacement Programs mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-13 – SDGE 1-14).

Costs: Costs for this program were approved in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested and are pending before the CPUC in A.17-10-007. However, in this Plan SDG&E is proposing to accelerate the FiRM program beyond the levels forecasted in A.17-10-007.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

FiRM Program	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$49.5	$60.5	$79.2	$96.8
Incremental O&M (Directs, 2019$ in MM)	$0	$0	$.60	$1.8
Miles of Circuit Hardened	81	99	121.5	148.5

Pole Risk Mitigation and Engineering (PRiME)

Plan Cross-reference: Section 4.3.10

Objective Time Frame: This new program will continue over the compliance period of this Plan.

Metric: Number of poles hardened.

New/Existing: PRiME is a new program. As discussed in Section 4.3.10, the PRiME program within the HFTD plans to be completed by 2027.

Meet or Exceed Regulations: This program meets and exceeds GO 95 requirements for overhead structures.

Risk Mitigation: This program mitigates the risk of wildfire by replacing at risk and aging distribution structures within the HFTD.

This falls under the Design and Construction mitigation category.

RAMP: PRiME was presented in the 2016 RAMP Report[1] in the Premature Overhead Failure proposed mitigation to Electric Infrastructure Integrity risk (*see* I.16-10-015, Chapter SDG&E-12 at SDG&E 12-17). The reason for that risk association was because PRiME was intended to be a system wide program (i.e., not limited to the HFTD). That said, SDG&E recognized in its Electric Distribution – Capital workpapers in A.17-10-007 that PRiME also helps to mitigate the risk of wildfire by reducing the potential for a fire ignition (*see* A.17-10-007, Exhibit 75 at 804). Given the recent California Fires, SDG&E is prioritizing the HFTD with this program, and this has included it in this Plan.

Costs: Forecasted costs for this program were first requested in A.17-10-007, which is pending before the CPUC. However, in this Plan SDG&E is proposing to accelerate PRiME beyond the levels forecasted in A.17-10-007 beginning in 2020. While the forecasted costs in A.17-10-007 were presented for the entire system, the cost estimates included below only include the activities related to wildfire mitigation.

It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

PRiME	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$14.4	$21.6	$36.8	$55.2
Incremental O&M (Directs, 2019$ in MM)	$0.29	$1.0	$0.74	$2.8
Poles Replaced	560	840	1,360	2,040

[1] PRiME was renamed from Post Construction True-Up Quality Assurance and Quality Control which was presented in the 2016 RAMP Report. The program was presented as PRiME in A.17-10-007.

Expulsion Fuse Replacement

Plan Cross-reference: Section 4.3.11

Objective Time Frame: This new program will continue over the compliance period of this Plan. This program is planned to be completed in three years (2021).

New/Existing: Expulsion Fuse Replacement is a new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451 by protectively replacing at risk fuses with CalFire approved fuses.

Risk Mitigation: This program mitigates the risk of wildfire by replacing existing expulsion fuses with fuses that are CalFire approved as a mitigation to wildfire risk.

This falls under the Design and Construction mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: This program is being presented for the first time in this Plan. It is SDG&E's intent to record costs for this program in the FRMMA for evaluation at a later time.

Expulsion Fuse Replacement	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$7.8	$11.6	$7.8	$11.6

Hotline Clamps

Plan Cross-reference: Section 4.3.12

Objective Time Frame: This new program will continue over the compliance period of this Plan. This program is planned to be completed in six years (2024).

New/Existing: The programmatic replacement of Hotline Clamps is a new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451 by replacing high risk connectors.

Risk Mitigation: This program mitigates the risk of wildfire by reducing a potential wire down that occurs when this particular clamp fails.

This falls under the Design and Construction mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: This program is being presented for the first time in this Plan, as the analysis of this type of failure was recently completed and not available when SDG&E filed A.17-10-007. It is SDG&E's intent to record costs for this program in the FRMMA for evaluation at a later time.

Hotline Clamps	2019		2020	
	Low	High	Low	High
Incremental O&M (Directs, 2019$ in MM)	$1.2	$1.8	$2.4	$3.6

Wire Safety Enhancement (WiSE)

Plan Cross-reference: Section 4.3.13

Objective Time Frame: This new program will continue over the compliance period of this Plan. SDG&E plans to continue this program into 2021 and will continue to monitor weather and wind conditions in areas outside the HFTD for wildfire risk mitigation in future years.

New/Existing: WiSE is a new program.

Meet or Exceed Regulations: This program meets and exceeds GO 95 requirements.

Risk Mitigation: This program mitigates the risk of wildfire by fire hardening distribution circuits in high fire risk areas outside the HFTD.

This falls under the Design and Construction mitigation category.

RAMP: WiSE was presented in the 2016 RAMP Report as the Small Conductor Replacement Program (*see* I.16-10-015, Chapter SDG&E-12 at SDGE 12-15 – SDGE 12-17). At the time of the 2016 RAMP Report, it was presented as a mitigation to Electric Infrastructure Integrity risk with goals to harden circuit elements (similar to FiRM, but outside the HFTD), in urban areas where downed wire could cause public safety hazards. However, in the recent red flag warning high wind events of 2017 and 2018, SDG&E has noticed high winds and drier conditions outside the HFTD, thus wanted a program to address these concerns. WiSE has been repurposed as wildfire risk mitigation and therefore included in this Plan to address fire concerning areas outside the HFTD before moving into the urban areas.

Costs: Forecasted costs for this program were first requested in A.17-10-007, which is pending before the CPUC, as the Small Conductor Replacement Program. While the forecasted costs in A.17-10-007 were presented for the entire system, the cost estimates included below only include the activities related to wildfire mitigation.

It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

WiSE	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$1.8	$3.0	$4.2	$6.7
Incremental O&M (Directs, 2019$ in MM)	$0.04	$0.15	$0.08	$0.34

Covered Conductor

Plan Cross-reference: Section 4.3.14

Objective Time Frame: This new program will continue over the compliance period of this Plan.

New/Existing: Covered Conductor is a new program.

Meet or Exceed Regulations: This program meets or exceeds GO 95 requirements.

Risk Mitigation: This program mitigates the risk of wildfire by installing conductor that will be resistant to phase to phase faults caused by third-party objects and vegetation.

This falls under the Design and Construction mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: This program is being presented for the first time in this Plan. It is SDG&E's intent to record the incremental costs incurred by utilizing covered conductor, which are not planned to start until 2020, in the FRMMA for evaluation at a later time. As SDG&E is developing both the criteria and standards for this program, the actual scope for 2020 is unknown at this time, which accounts for the wide forecasted range.

Covered Conductor	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$0	$0	$0	$20

Fire Threat Zone Advanced Protection

Plan Cross-reference: Section 4.3.15

Objective Time Frame: This new program will continue over the compliance period of this Plan.

New/Existing: Fire Threat Zone Advanced Protection is a new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451 by installing advanced protection and communications on substation and distribution circuit infrastructure.

Risk Mitigation: This program mitigates the risk of wildfire by installing the sectionalizing devices, relays, and controls to enable advanced protection features, including sensitive profile settings, sensitive ground fault detection, down conductor detection, and falling conductor protection.

This falls under the Design and Construction mitigation category.

RAMP: This program was included in the Design and Engineering Approaches mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: Forecasted costs for this program were requested and are pending before the CPUC in A.17-10-007. It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Fire Threat Zone Advanced Protection	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$2.4	$3.6	$3.4	$5.2

LTE Communication Network

Plan Cross-reference: Section 4.3.16

Objective Time Frame: This new program will continue over the compliance period of this Plan. This program is planned to finish deployment in the HFTD by 2021.

New/Existing: LTE Communication Network is a new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by enabling more reliable communication for all the remote devices that depend on communication to function as intended. In addition, it provides another means of communication for crews during red flag deployments.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: LTE Communication Network was not presented in the 2016 RAMP Report.

Costs: Forecasted costs for this program were requested and are pending before the CPUC in A.17-10-007. It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

LTE Communication Network	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$8.8	$13.2	$36	$52

Automated Reclosers

Plan Cross-reference: Section 4.3.17

Objective Time Frame: This is a completed program that will remain in effect over the compliance period of this Plan.

New/Existing: Automated Reclosers is an existing, completed program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire through the pulse closing technology when reclosing is enabled. In addition, these devices help to minimize impacts to customers during PSPS events.

This falls under the Design and Construction mitigation category.

RAMP: Automated Reclosers were not part of the 2016 RAMP Report.

Costs: Costs for this program were authorized in D.16-06-054 for the 2016 GRC cycle. There are no new, incremental costs associated with this program.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time.

Public Safety Power Shutoff Engineering Enhancements

Plan Cross-reference: Section 4.3.18

Objective Time Frame: This new program will continue over the compliance period of this Plan.

New/Existing: The Public Safety Power Shutoff Engineering Enhancements is a new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the exposure of customers to PSPS events by installing additional sectionalizing devices so that SDG&E is able to take a targeted approach during de-energized events, impacting only the necessary customers.

This falls under the Response and Recovery mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: This program is being presented for the first time in this Plan. It is SDG&E's intent to record costs for this program in the FRMMA for evaluation at a later time.

Public Safety Power Shutoff Enhancements	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Capital (Directs, 2019$ in MM)	$0.4	$0.7	$0.4	$0.7

Pole Replacement and Reinforcement

Plan Cross-reference: Section 4.3.19

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Pole Replacement and Reinforcement is an existing program. This annual program spans the entire service territory. The scope of this program will vary depending on the prior year's intrusive inspection results.

Meet or Exceed Regulations: This program meets GO 165 inspection and maintenance requirements. In addition, pole replacements are constructed to meet or exceed GO 95 requirements.

Risk Mitigation: This program mitigates the risk of wildfire by replacing poles found in poor condition through visual or intrusive inspections.

This falls under the Inspection and Maintenance mitigation category.

RAMP: This program was included in the Inspection, Repair, Maintenance & Replacement Programs mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-13 – SDGE 1-14).

Costs: Costs for this program were approved in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested and are pending before the CPUC in A.17-10-007. However, in this Plan SDG&E is proposing to expand this program beyond the levels in A.17-10-007. In this Plan, costs for this program have been prorated based on the estimated number of poles to be replaced within the HFTD.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Pole Replacement and Reinforcement	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Capital (Directs, 2019$ in MM)	$10.6	$16.0	$10.6	$16.0
Incremental O&M (Directs, 2019$ in MM)	$0.1	$0.25	$0.1	$0.25

Backup Power for Resilience

Plan Cross-reference: Section 4.3.20

Objective Time Frame: This new program will continue over the compliance period of this Plan.

New/Existing: Backup Power for Resilience is a new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by focusing on investing in infrastructure to provide back-up power to strategic locations to minimize the impact that PSPS events have on the communities impacted.

This falls under the Response and Recovery mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: While there are forecasted costs for this program requested and pending before the CPUC in A.17-10-007, in this Plan the Backup Power for Resilience program has been expanded beyond the levels in A.17-10-007.

It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Backup Power for Resilience	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$2.4	$3.6	$5.4	$8.0
Incremental O&M (Directs, 2019$ in MM)	$0.5	$0.9	$1.0	$1.6

Tree Database

Plan Cross-reference: Section 4.4.1

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: The Vegetation Management Tree Database is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451, GO 95, PRC § 4293, and North American Electric Reliability Corporation (NERC) reliability standard FAC-003-4 by allowing the timely capture and management of vegetation near electrical lines and equipment. The system "PowerworkZ" (PWZ) was developed inhouse to meet the specific needs for SDG&E by enabling historical tracking of all vegetation management work activities.

Risk Mitigation: This program mitigates the risk of wildfire by providing a schedule-driven system that enables the management of a tree population with current and historic information including the growth rates, health, and status of all trees within SDG&E's inventory. This system allows for pre-planning and documentation of all work.

This falls under the Inspection and Maintenance mitigation category.

RAMP: SDG&E's Vegetation Management program was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: Costs for this program were approved through a one-way balancing account in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested via a two-way balancing account and are pending before the CPUC in A.17-10-007. If the two-way balancing account is approved in A.17-10-007, it would allow SDG&E to recover costs above the authorized GRC levels. SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Patrol and Pruning

Plan Cross-reference: Section 4.4.2

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: Patrol and Pruning is an existing program.

Meet or Exceed Regulations: This program meets or exceeds GO 95, PRC §§ 4292 and 4293, and NERC FAC-003-4.

Risk Mitigation: This program mitigates the risk of wildfire by increasing the frequency of tree inspections beyond an annual assessment of trees that have the potential to impact the overhead electrical facilities. The patrol is in addition to the routinely-scheduled inspection of trees and includes the assessment of the hazard potential of all trees within striking distance of the lines. Patrol and Pruning activities take place before the onset of the most dangerous fire weather conditions which occur during the fall.

This falls under the Inspection and Maintenance mitigation category.

RAMP: SDG&E's Vegetation Management program was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: Costs for this program were approved through a one-way balancing account in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested via a two-way balancing account and are pending before the CPUC in A.17-10-007. If the two-way balancing account is approved in A.17-10-007, it would allow SDG&E to recover costs above the authorized GRC levels. SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Enhanced Inspections, Patrols, and Trimming

Plan Cross-reference: Section 4.4.3

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: Enhanced inspections, patrols, and trimming is a new program.

Meet or Exceed Regulations: This program meets or exceeds GO 95, PRC §§ 4292 and 4293, and NERC FAC-003-4.

Risk Mitigation: This program mitigates the risk of wildfire by both increasing the frequency of vegetation inspections, and by increasing the minimum vegetation clearance from the lines to 25' where achievable.

This falls under the Inspection and Maintenance mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: This program is being presented for the first time in this Plan. It is SDG&E's intent to record costs for this program in the FRMMA for evaluation at a later time.

Enhanced Inspections Patrols and Trimming	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Incremental O&M (Directs, 2019$ in MM)	$2.4	$3.6	$2.4	$3.6

Technology (Vegetation Management)

Plan Cross-reference: Section 4.4.4

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: Technology (Vegetation Management) is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451, GO 95, PRC §§ 4292 and 4293, and NERC FAC-003-4.

Risk Mitigation: This program mitigates the risk of wildfire by utilizing historical and contextual data to forecast where vegetation management operations may be focused or prioritized. GIS and database analyses using metrics including vegetation type, weather, topography, outage history can help predict where tree failures are likely to occur. SDG&E has implemented the use of LiDAR to enhance its inspection operations and to validate vegetation clearances. The use of this technology is intended to only supplement these activities and will be integrated on a limited basis.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: SDG&E's Vegetation Management program was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: Costs for this program were approved through a one-way balancing account in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested via a two-way balancing account and are pending before the CPUC in A.17-10-007. If the two-way balancing account is approved in A.17-10-007, it would allow SDG&E to recover costs above the authorized GRC levels. SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Quality Assurance

Plan Cross-reference: Section 4.4.5

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: Quality Assurance is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451, GO 95, PRC §§ 4292 and 4293, and NERC FAC-003-4.

Risk Mitigation: This program mitigates the risk of wildfire by measuring all work performed by contractors to validate that they meet or exceed the Scopes of Work, and are in compliance with the requirements of GO 95, Rule 35 and Public Resources Codes 4292 and 4293. This includes the activities of pre-inspection, tree pruning and removal, and pole brush clearing. Included in the Scope of Work for Quality Assurance, the contractor performs a full patrol of all overhead primary and transmission lines to confirm minimum clearance requirements will be maintained until the next pre-inspection activity. The Quality Assurance inspection serves as a de facto mid-cycle patrol of the lines and provides an additional opportunity to identify hazardous trees.

This falls under the Inspection and Maintenance mitigation category.

RAMP: SDG&E's Vegetation Management program was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: Costs for this program were approved through a one-way balancing account in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested via a two-way balancing account and are pending before the CPUC in A.17-10-007. If the two-way balancing account is approved in A.17-10-007, it would allow SDG&E to recover costs above the authorized GRC levels. SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Hazard Tree Removal and Right Tree-Right Place

Plan Cross-reference: Section 4.4.6

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: Hazard Tree Removal and Right Tree-Right Place is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451, GO 95, PRC §§ 4292 and 4293, and NERC FAC-003-4 by preventing fire ignition caused by tree-line contacts. Right Tree-Right Place is the concept of replacing incompatible trees located near power lines with compatible species that do not pose a threat to electrical infrastructure.

Risk Mitigation: This program mitigates the risk of wildfire by removing hazardous trees (i.e., dead, dying, diseased, structural defective) that could shed a limb or fall onto a powerline and cause an ignition. SDG&E targets for removal species, such as eucalyptus and palm, with known growth and failure patterns. As a standard pruning practice, SDG&E also proactively removes all tree branches overhanging the conductor to reduce the chance of impact with the power lines. SDG&E's Right Tree-Right Place program follows the concept of planting trees near powerlines that will not encroach upon or require maintenance near power lines. The Right Tree-Right Place program provides for higher reliability, public safety, reduced maintenance costs, and preserves the health of trees.

This falls under the Inspection and Maintenance mitigation category.

RAMP: SDG&E's Vegetation Management program was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: Costs for this program were approved through a one-way balancing account in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested via a two-way balancing account and are pending before the CPUC in A.17-10-007. If the two-way balancing account is approved in A.17-10-007, it would allow SDG&E to recover costs above the authorized GRC levels. SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Pole Brushing

Plan Cross-reference: Section 4.4.7

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: Pole Brushing is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the regulations set forth in PRC § 4292 to prevent the ignition and propagation of fire caused by SDG&E pole-mounted equipment.

Risk Mitigation: This program mitigates the risk of wildfire by performing inspection, customer communications, and multiple brushing activities within the annual cycle including mechanical brush, herbicide application and re-clear. These activities are scheduled in sequence to ensure compliance for the duration of the annual cycle. The timing of the pole brushing activities prevents vegetation from recurring within the cleared radius of the subject poles. Additionally, SDG&E conducts pole brushing on approximately 3,000 poles that are not subject to the clearance requirements in areas with flammable vegetation, steep slope, or adjacent to wildland interfaces where a fire could propagate.

This falls under the Inspection and Maintenance mitigation category.

RAMP: SDG&E's Vegetation Management program was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: The job activities described in this program are performed on a day to day basis by the Vegetation Management work group. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business within Electric Distribution O&M. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Electric Equipment Training

Plan Cross-reference: Section 4.4.8

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: Electric Equipment Training is new program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by jointly inspecting SDG&E facilities with CalFire to better understand wildfire risk and site-specific hazards.

This falls under the Inspection and Maintenance mitigation category.

RAMP: SDG&E's Vegetation Management program was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-16).

Costs: Forecasted costs for this program were requested and are pending before the CPUC in A.17-10-007 for the 2019 GRC cycle. It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Electric Equipment Training	2019		2020	
	Low	High	Low	High
Incremental O&M (Directs, 2019$ in MM)	$0.024	$0.036	$0.024	$0.036

Red Flag Operations (Vegetation Management)

Plan Cross-reference: Section 4.4.9

Objective Time Frame: This program will continue over the compliance period of this Plan. This program has high variability as the utilization will depend on the number of red flag events, and the amount of circuits forecasted to be impacted by red flag events.

New/Existing: Red Flag Operations (Vegetation Management) is a new program.

Meet or Exceed Regulations: This program meets or exceeds GO 95, PRC §§ 4292 and 4293, and NERC FAC-003-4 by conducting additional vegetation inspections around red flag events.

Risk Mitigation: This program can mitigate the risk of wildfire by proactively staging inspectors in known areas of high fire potential, such as large tree density and high wind corridors, to monitor for conditions that may cause an ignition in the upcoming red flag event.

This falls under the Inspection and Maintenance mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: This program is being presented for the first time in this Plan. It is SDG&E's intent to record costs for this program in the FRMMA for evaluation at a later time.

Red Flag Operations (Vegetation Management)	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Incremental O&M (Directs, 2019$ in MM)	$0.30	$0.90	$0.30	$0.90

Fire Science and Climate Adaption Department

Plan Cross-reference: Section 4.5.1

Objective Time Frame: This strategy that will continue over the compliance period of this Plan.

New/Existing: The Fire Science and Climate Adaption Department is a new strategy, created in 2018. The FS&CA department is responsible to manage wildfire risk. It also has the responsibility of producing, compiling, and finalizing SDG&E's reoccurring Wildfire Mitigation Plan to reflect the planned activities to achieve the requirements of P.U. Code § 8386(c). In addition, many of the existing situational awareness tools (e.g., SAWTI and FPI) are managed through this department.

Meet or Exceed Regulations: The establishment of the Fire Science and Climate Adaption Department is a fire mitigation strategy, which meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates risk by enhancing the ability to anticipate, prepare for, react to, and recover from significant fire weather events.

This falls primarily under the Situational/Conditional Awareness mitigation category.

RAMP: While this department was not presented in the 2016 RAMP Report, several of the situation awareness tools managed by this new department were included in the Monitoring and Detection mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14 and SDGE 1-17).

Costs: Certain costs for this strategy were approved in D.16-06-054 for the 2016 GRC cycle. Forecasted costs to expand aspects of this strategy for the 2019 GRC cycle were requested and are pending before the CPUC in A.17-10-007. However, this department in its current form was not included in A.17-10-007 as it was not established when SDG&E filed its 2019 GRC. Accordingly, in this Plan SDG&E is proposing to expand this strategy beyond the levels in A.17-10-007.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Fire Science and Climate Adaption Department	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Incremental O&M (Directs, 2019$ in MM)	$1.6	$2.4	$1.6	$2.4

Meteorological Capabilities and Technologies

Plan Cross-reference: Section 4.5.2

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Meteorological Capabilities and Technologies is an existing strategy. As stated in Section 4.5.2, SDG&E has five full-time degreed and experienced meteorologists on staff with expertise in program management, utility forecasting, data science, and Southern California fire weather. SDG&E owns and operates a network of over 175 weather stations that are physically located on electric distribution and transmission poles and provide temperature, humidity, and winds observation every 10 minutes. SDG&E owns four high-performance computing clusters that are used to generate high quality weather data that is incorporated directly into operations.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by supporting the SDG&E situational awareness capabilities.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This strategy was included in the Monitoring and Detection mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14 and SDGE 1-17).

Costs: Please refer to the Fire Science and Climate Adaption Department workpaper.

Fire Potential Index (FPI)

Plan Cross-reference: Section 4.5.3

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Fire Potential Index is an existing strategy. As stated in Section 4.5.3, the FPI was developed by SDG&E subject matter experts to communicate the wildfire potential on any given day to promote safe and reliable operations.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by classifying the fire potential based on weather and fuels conditions and historical fire occurrences within each of SDG&E's eight operating districts. This is also shared with local fire agencies, emergency responders, and the National Weather Service.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This strategy was included in the Monitoring and Detection mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14 and SDGE 1-17).

Costs: Please refer to the Fire Science and Climate Adaption Department workpaper.

Santa Ana Wildfire Threat Index (SAWTI)

Plan Cross-reference: Section 4.5.4

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Santa Ana Wildfire Threat Index is an existing strategy. As stated in Section 4.5.4, the SAWTI categorizes Santa Ana winds based on anticipated fire potential and uses several meteorological and fuel moisture variables generated from the Weather Research and Forecasting (WRF) Model to forecast the index out to six days.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by leveraging big data and analytics to assess the wildfire potential associated with an approaching weather event and sharing that information with stakeholder in the community and the public.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This strategy was included in the Monitoring and Detection mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14 and SDGE 1-17).

Costs: Please refer to the Fire Science and Climate Adaption Department workpaper.

Wildfire Risk Reduction Model – Operational System (WRRM-Ops)

Plan Cross-reference: Section 4.5.5

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: WRRM-Ops (Fire Behavior Modeling) is an existing program. As stated in Section 4.5.5, significant intelligence related to the wildfire potential is also gathered from SDG&E's WRRM-Ops, which integrates the latest weather and GIS technology to understand wildfire growth patterns across the region.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by assessing the areas of highest fire danger before a wildfire begins so preventative measures can be taken to enhance public safety and ensure the reliable operation of the electric system.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This program was included in the Monitoring and Detection mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14 and SDGE 1-17).

Costs: While there are forecasted costs for this program requested and pending before the CPUC in A.17-10-007, in this Plan the WRRM-Ops program has been expanded beyond the levels in A.17-10-007. It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

WRRM-Ops	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$0.3	$0.5	$0.3	$0.5

Camera Networks and Fire Detection

Plan Cross-reference: Section 4.5.6

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Camera Networks and Fire Detection is an existing strategy. As stated in Section 4.5.6, SDG&E utilizes a total of 107 cameras that enhance situational awareness around wildfire. Twenty of these cameras are owned by SDG&E, while 87 cameras are supported by SDG&E in collaboration with the University of California San Diego (UCSD) as part of the High Performance Wireless Research and Education Network (HPWREN).

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire by enhancing situational awareness and improving SDG&E's ability to react to wildfires on the landscape. These cameras are also heavily used by CalFire.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This strategy was included in the Monitoring and Detection mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14 and SDGE 1-17).

Costs: Please refer to the Fire Science and Climate Adaption Department workpaper.

Climate Change Adaptation

Plan Cross-reference: Section 4.6

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Climate Change Adaptation is an existing strategy. As stated in Section 4.6, data ranging back to 1984 across San Diego County confirms that the number of high fire potential days has increased since the early 2000's. These trends are projected to continue as a combination of factors leads to increases in both fire season duration and severity through the end of the century.

Meet or Exceed Regulations: This strategy meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This strategy mitigates the risk of wildfire through tracking and better understanding the impact that our changing climate is likely to have on the fire environment.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This strategy was included in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-8 – SDGE 1-9 and Chapter SDG&E-14).

Costs: Incremental, forecasted costs related to Climate Change Adaptation pending in A.17-10-007 are not included in this Plan as they are not associated with wildfire. Accordingly, SDG&E is not seeking or anticipating incremental costs associated with this program at this time.

Wireless Fault Indicators

Plan Cross-reference: Section 4.6.2

Objective Time Frame: This program will continue over the compliance period of this Plan. This program is planned for completion in 2021.

New/Existing: Wireless Fault Indicators is an existing program.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by providing awareness to where faults occurred so that remote cameras can be directed to see if an ignition took place. This program helps to minimize the consequence of a fire should it occur.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: This program was included in the Design and Engineering Approaches mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-1 at SDGE 1-14).

Costs: Costs for this program were approved in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested and are pending before the CPUC in A.17-10-007.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Wireless Fault Indicators	2019		2020	
	Low	High	Low	High
Capital (Directs, 2019$ in MM)	$0.48	$0.72	$0.48	$0.72

Advanced Weather Station Integration and Forecast

Plan Cross-reference: Section 4.6.3

Objective Time Frame: This program will continue over the compliance period of this Plan.

New/Existing: Advanced Weather Station Integration and Forecast is a new program. As stated in Section 4.6.3, the Advanced Weather Station Integration and Forecast program seeks to further modernize the SDG&E weather network.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by continuously monitoring the wildfire environment across the SDG&E service territory using the best tools available.

This falls under the Situational/Conditional Awareness mitigation category.

RAMP: Because this is a new program, it was not presented in the 2016 RAMP Report.

Costs: While there are costs for this program requested and pending before the CPUC in A.17-10-007, in this Plan the Advanced Weather Station Integration and Forecast program has been expanded beyond the levels in A.17-10-007.

It is SDG&E's intent to record costs for this program in the FRMMA. Once a decision in A.17-10-007 is implemented, SDG&E will reconcile the amounts for purposes of the FRMMA.

Advanced Weather Station Integration and Forecast	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Capital (Directs, 2019$ in MM)	$0.5	$0.7	$0.5	$0.7

Strategy for Minimizing Public Safety Risk During High Wildfire Conditions

Plan Cross-reference: Section 4.7.1

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Public Safety Power Shutoff Protocols is an existing strategy. As stated in Section 4.7, SDG&E has an obligation to operate its system safely. This obligation requires SDG&E to de-energize circuits (i.e., turn off power) when necessary to protect public safety (Public Safety Power Shutoff or PSPS).

Meet or Exceed Regulations: This strategy meets and exceeds P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.

Risk Mitigation: This strategy mitigates the risk of wildfire by de-energizing power lines that are experiencing extreme fire weather conditions.

This falls under the Operation Practices mitigation category.

RAMP: This strategy was not presented in the 2016 RAMP Report.

Costs: The job activities that occur during a PSPS event are performed by multiple work groups. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Public Safety Power Shutoff Protocols

Plan Cross-reference: Section 4.7.2

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Public Safety Power Shutoff Protocols is an existing strategy. As stated in Section 4.7.2, if SDG&E determines it is necessary to employ a PSPS for portions of its system, re-energization will take place after the SDG&E Weather Network shows that wind speeds have decreased, and SDG&E weather forecasts indicate that winds will not re-accelerate above dangerous levels.

Meet or Exceed Regulations: This strategy meets and exceeds P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.

Risk Mitigation: This strategy mitigates the risk of wildfire by confirming that electrical lines are structurally sound and free of debris after the extreme fire weather conditions have ceased.

This falls under the Operation Practices mitigation category.

RAMP: This strategy was not presented in the 2016 RAMP Report.

Costs: The job activities that occur during a PSPS event are performed by multiple work groups. Costs for performing this work were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Communication Practices

Plan Cross-reference: Section 4.7.4

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: Communication Practices related to Public Safety Power Shutoff is an existing program. As stated in Section 4.7, in advance of the peak of fire season, SDG&E will conduct ongoing education campaigns in five languages (English, Spanish, Chinese, Filipino, Vietnamese) regarding how to be prepared for emergencies in the event of a wildfire, natural disaster or major outage. SDG&E anticipates that this education campaign will also encourage customers to sign up for outage notifications, with the goal of raising awareness about SDG&E's PSPS procedures. SDG&E will also be updating its Enterprise Notification System (ENS) to enhance customer service.

Meet or Exceed Regulations: This program meets and exceeds P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.

Risk Mitigation: This program mitigates the risk of wildfire by its association to de-energizing power lines that are experiencing extreme fire weather conditions.

This falls under the Operation Practices mitigation category.

RAMP: SDG&E's Customer Communications and First Responder Training was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-3 at SDGE 3-16 and SDGE 3-17).

Costs: Certain costs for this program were approved in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested and are pending before the CPUC in A.17-10-007. However, in this Plan SDG&E is proposing to expand the Communication Practices related to the Public Safety Power Shutoff program beyond the levels in A.17-10-007.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Communication Practices related to Public Safety Power Shutoff	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Incremental O&M (Directs, 2019$ in MM)	$2.0	$3.0	$2.0	$3.0
Capital (Directs, 2019$ in MM)	$0.50	$0.70	$0.50	$0.70

Mitigating the Public Safety Impact of PSPS Protocols

Plan Cross-reference: Section 4.7.5

Objective Time Frame: This is an ongoing strategy that will continue over the compliance period of this Plan.

New/Existing: Mitigating the Public Safety Impact of PSPS Protocols is an existing strategy. As stated in Section 4.7.5, SDG&E manages and mitigates the impacts of a PSPS event through collaborations with key stakeholders in the wildfire response community.

Meet or Exceed Regulations: This strategy meets and exceeds P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.

Risk Mitigation: This strategy mitigates the risk of wildfire by mitigating the risk associated with Public Safety Power Shutoff.

This falls under the Operation Practices and Response and Recovery mitigation category.

RAMP: SDG&E's Customer Communications and First Responder Training was included as a mitigation in the 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-3 at SDGE 3-16 and SDGE 3-17).

Costs: Please refer to the Fire Science and Climate Adaption Department workpaper.

Emergency Management Operations

Cross-reference: Sections 4.1.4.2, 4.1.4.3, and 5.1

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: This is an existing program that supports effective, efficient, and collaborative planning, preparedness, response, and recovery processes for all hazards and risks, including those associated with wildfire and RFW incidents enterprise-wide.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by effectively coordinating the SDG&E's pre-incident and response/recovery activities during periods of high wildfire risk and/or wildfire activity, which is inclusive of Aviation Services' operation of air resources, and SDG&E's full operational response to Red Flag Warning or extreme FPI activation and response.

This falls under the Operational Practices and Response and Recovery mitigation categories.

RAMP: This program was addressed in the Customer Communications and First Responder Training mitigation in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-3 at SDGE 3-16 – SDGE-17).

Costs: Certain costs for this program were approved in D.16-06-054 for the 2016 GRC cycle. Forecasted costs for this program for the 2019 GRC cycle were requested and are pending before the CPUC in A.17-10-007. However, in this Plan SDG&E is proposing to expand the Emergency Management Operations program beyond the levels in A.17-10-007.

To the extent additional costs are incurred that are not otherwise covered in SDG&E's revenue requirements, it is SDG&E's intent to record those costs in its FRMMA to be evaluated at a later time. SDG&E will reconcile the amounts in the FRMMA, as necessary, once a decision in A.17-10-007 is implemented.

Emergency Management Operations	**2019**		**2020**	
	Low	**High**	**Low**	**High**
Incremental O&M (Directs, 2019$ in MM)	$4.0	$6.0	$4.0	$6.0
Emergency Response Preparedness Trainings Conducted	225	250	225	250

Disaster and Emergency Preparedness Plan

Cross-reference: Section 5.2

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: This is an existing program. As stated in Section 5.2.1, SDG&E's Company Emergency Response Plan (CERP) and risk specific response plans provide a framework by which SDG&E can effectively coordinate SDG&E's pre-incident and response/recovery activities to a given threat or hazard.

Meet or Exceed Regulations: This program meets and exceeds the requirement to furnish and maintain a safe and reliable utility system in accordance with P.U. Code § 451.

Risk Mitigation: This program mitigates the risk of wildfire by effectively planning and documenting SDG&E's pre-incident and response/recovery activities during periods of high wildfire risk and/or wildfire activity.

This falls under the Response and Recovery mitigation category.

RAMP: This program was addressed in the Customer Communications and First Responder Training mitigation and the Workforce Planning risk chapter in SDG&E's 2016 RAMP Report (*see* I.16-10-015, Chapter SDG&E-3 at SDGE 3-16 – SDGE 3-17; Chapter SDG&E-17).

Costs: Please refer to the Emergency Management Operations workpaper.

Customer Support in Emergencies

Cross-reference: Section 5.3

Objective Time Frame: This is an ongoing program that will continue over the compliance period of this Plan.

New/Existing: Customer Support in Emergencies is an existing program to accommodate for the impacts from wildfire. Consumer protections are for more than just wildfires, they cover all emergencies. As stated in Section 5.3, SDG&E provides emergency residential and non-residential customer protections and available communications for wildfire victims, as ordered by the CPUC.

Meet or Exceed Regulations: SDG&E's Customer Support in Emergencies program meets or exceeds Resolution M-4835.

Risk Mitigation: This program mitigates the risk of wildfire impacts to customers by providing consumer protections to customers impacted by wildfire.

This falls under the Response and Recovery mitigation category.

RAMP: This program was not included in the 2016 RAMP Report.

Costs: General customer support related costs were authorized through D.16-06-054 for the 2016 GRC cycle by funding base business. Forecasted costs are also pending CPUC approval in A.17-10-007 for the 2019 GRC cycle. There are no incremental costs associated with this strategy as consumer protection costs in emergencies are addressed through a separate mechanism.

Upon the Governor of California declaring a state of emergency because of a disaster, SDG&E will make an advice filing and begin recording costs for each applicable event to the Emergency Customer Protections Memorandum Account (ECPMA). Costs that are incurred outside of a state of emergency are funded through current resources, as noted above.

Monitoring and Correcting Deficiencies

Plan Cross-Reference: Section 6.4.1

Objective Time Frame: This strategy will continue over the compliance period of this Plan.

New/Existing: Monitoring and Correcting Deficiencies is a new strategy. It will execute, monitor, review, and address deficiencies in SDG&E's approach to wildfires, consistent with SDG&E's Plan. This strategy allows for wide collaboration and information gathering, as well as the ability to inform, plan, act, and improve within a compressed timeline, when needed.

Meet or Exceed Regulations: This strategy meets and exceeds the requirements set forth in P.U. Code § 8386, as amended by Senate Bill 901.

Risk Mitigation: This strategy mitigates the risk of wildfire by closely monitoring and evaluating the initiatives and programs designed to mitigate fire and enable course correction as necessary.

This strategy is associated with the all of the mitigation categories: (1) Design and Construction, (2) Inspection and Maintenance, (3) Operational Practices, (4) Situational/Conditional Awareness, and (5) Response and Recovery.

RAMP: Because this is a new strategy, it was not presented in SDG&E's 2016 RAMP Report.

Costs: Please refer to the Fire Science and Climate Adaption Department workpaper.

Appendix B

Table – § 8386(c)(3)(4)(8)(9): Wildfire Mitigation Strategies and Programs

Per the ALJ Ruling (at 2-3), SDG&E provides the following table. The table summarizes information included in Section 4 of SDG&E's Wildfire Mitigation Plan. To the extent SDG&E had the information in its possession in table for this Plan filing, it is included.

Wildfire Mitigation Strategies and Programs [1]

Program / Strategy	Categories: (1) Design and Construction, (2) Inspection and Maintenance, (3) Operational Practices, (4) Situational/Conditional Awareness, and/or (5) Response and Recovery	Asset Addressed (Ex: line, poles, etc.)	2019 Cost Estimate - Direct Capital (2019$ in MM)[2]	2019 Cost Estimate - Incremental O&M (2019$ in MM)[3]	Costs Currently Reflected in Revenue Requirement? (Provide Decision Reference)[4]	Compliance Requirement? (Provide code or GO reference)[5]	Identify any Aspects of Plan/Strategy and Associated Funding That Is or Will Be Addressed in Another Case (Identify Case)[6]	Identify Any Memorandum Accounts Where Costs of Program/Strategy Are Being Tracked and Explain How Double Tracking Is Prevented[7]	Previously included in RAMP? (Provide Reference)[8]	Evaluation Metric(s)[9]	Assumptions Underlying Metric[10]
OPERATIONAL PRACTICES										% of reclosers that protect the HFTD that are disabled during elevated or extreme FPI conditions	Refer to Section 6.2 of Wildfire Mitigation Plan
Response to Change in Operating Conditions	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Recloser Protocols	Operation Practices	reclosers	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Other Special Work Procedures	Operation Practices	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Wildfire Infrastrucure Protection Teams	Response and Recovery	various	$ -	$0.7 - $1.1	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Aviation Firefighting Program	Response and Recovery	various	$ -	$6.0 - $9.0	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Industrial Fire Brigade	Response and Recovery	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Ignition Management Program	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	No		
Fuel Management Program	Inspection and Maintenance	various	$ -	$0.4 - $0.6	No	PUC § 451	-	-	No		
PLANS FOR INSPECTION										% of inspections completed pursuant to GO 165 within a 12-month period	Refer to Section 6.2 of Wildfire Mitigation Plan
Distribution System Inspection	Inspection and Maintenance	various	$ -	$ -	D.16-06-054	GO 165	TY2019 GRC	-	Yes		
Substation System Inspection	Inspection and Maintenance	various	$ -	$ -	D.16-06-054	GO 174	TY2019 GRC	-	Yes		
Transmission System Inspection	Inspection and Maintenance	various	$ -	$ -	No - FERC	GO 95, GO 128, PRC §§ 4292 and 4293	-	-	Yes		
Geographic Iinformation System Data	Response and Recovery	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	No		
SYSTEM HARDENING										Number of miles system hardened in the HFTD	Refer to Section 6.2 of Wildfire Mitigation Plan
Design and Construction Standards	Design and Construction	various	$ -	$ -	D.16-06-054	GO 95, PUC § 451	TY2019 GRC	-	Yes		
Testing and Deploying Emerging Technologies	Design and Construction	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	No		
Facility Analysis	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	GO 165	TY2019 GRC	-	Yes		
Oversight of Activities in the Rural Areas	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	No		
Asset Management	Situational/Conditional Awareness	various	$ -	$1.2 - $1.8	No	PUC § 451	TY2019 GRC	-	No		
Overhead Transmission and Distribution Fire Hardening	Design and Construction	lines	$4.4 - $6.6	$0.09 - $0.33	D.16-06-054	GO 95	TY2019 GRC	-	Yes		
Underground Circuit Line Segments	Design and Construction	lines	$1.2 - $1.8	$ -	No	Tariff Rule 20D	-	-	No		
Cleveland National Forest Fire Hardening	Design and Construction	lines	$47.7 - $58.3	$0.95 - $2.9	D.16-06-054	GO 95	TY2019 GRC	-	Yes		
Fire Risk Mitigation	Design and Construction	lines	$49.5 - $60.5	$ -	D.16-06-054	GO 95, PUC § 451	TY2019 GRC	-	Yes		
Pole Risk Mitigation and Engineering	Design and Construction	poles	$14.4 - $21.6	$0.29 - $1.0	No	GO 95	TY2019 GRC	-	Yes		
Explusion Fuse Replacement	Design and Construction	fuses	$7.8 - $11.6	$ -	No	PUC § 451	-	-	No		
Hotline Clamps	Design and Construction	clamps	$ -	$1.2 - $1.8	No	PUC § 451	-	-	No		
Wire Safety Enhancement	Design and Construction	conductor	$1.8 - $3.0	$0.04 - $0.15	No	GO 95	TY2019 GRC	-	Yes		
Covered Conductor	Design and Construction	conductor	$ -	$ -	No	GO 95	-	-	No		
Fire Threat Zone Advanced Protection	Design and Construction	protection equipment	$2.4 - $3.6	$ -	No	PUC § 451	TY2019 GRC	-	Yes		
LTE Communication Network	Situational/Conditional Awareness	commincation equipment	$8.8 - $13.2	$ -	No	PUC § 451	TY2019 GRC	-	No		
Automated Reclosers	Design and Construction	reclosers	$ -	$ -	D.16-06-054	PUC § 451	-	-	No		
Public Safety Power Shutoff Engineering Enhancements	Response and Recovery	sectionalizing devices	$0.4 - $0.7	$ -	No	PUC § 451	-	-	No		
Pole Replacement and Reinforcement	Inspection and Maintenance	poles	$10.6 - $16.0	$0.1 - $0.25	D.16-06-054	GO 165, GO 95	TY2019 GRC	-	Yes		
Backup Power for Resilience	Response and Recovery	various	$2.4 - $3.6	$0.5 - $0.9	No	PUC § 451	TY2019 GRC	-	No		

Wildfire Mitigation Strategies and Programs [1]

Program / Strategy	Categories: (1) Design and Construction, (2) Inspection and Maintenance, (3) Operational Practices, (4) Situational/Conditional Awareness, and/or (5) Response and Recovery	Asset Addressed (Ex: line, poles, etc.)	2019 Cost Estimate - Direct Capital (2019$ in MM)[2]	2019 Cost Estimate - Incremental O&M (2019$ in MM)[3]	Costs Currently Reflected in Revenue Requirement? (Provide Decision Reference)[4]	Compliance Requirement? (Provide code or GO reference)[5]	Identify any Aspects of Plan/Strategy and Associated Funding That Is or Will Be Addressed in Another Case (Identify Case)[6]	Identify Any Memorandum Accounts Where Costs of Program/Strategy Are Being Tracked and Explain How Double Tracking Is Prevented[7]	Previously included in RAMP? (Provide Reference)[8]	Evaluation Metric(s)[9]	Assumptions Underlying Metric[10]
VEGETATION MANAGEMENT										% of vegetation inspections completed in the HFTD	Refer to Section 6.2 of Wildfire Mitigation Plan
Tree Database	Inspection and Maintenance	lines	$ -	$ -	D.16-06-054	PUC § 451, GO 95, PRC §§ 4292 and 4293, NERC FAC-003-4	TY2019 GRC	TTBA	Yes		
Patrol and Pruning	Inspection and Maintenance	lines	$ -	$ -	D.16-06-054	GO 95, PRC §§ 4292 and 4293, NERC FAC-003-4	TY2019 GRC	TTBA	Yes		
Enhanced Inspections, Patrols, and Trimming	Inspection and Maintenance	lines	$ -	$2.4 - $3.6	No	GO 95, PRC §§ 4292 and 4293, NERC FAC-003-4	-	-	No		
Technology	Situational/Conditional Awareness	lines	$ -	$ -	D.16-06-054	PUC § 451, GO 95, PRC §§ 4292 and 4293, NERC FAC-003-4	TY2019 GRC	TTBA	Yes		
Quality Assurance	Inspection and Maintenance	lines	$ -	$ -	D.16-06-054	PUC § 451, GO 95, PRC §§ 4292 and 4293, NERC FAC-003-4	TY2019 GRC	TTBA	Yes		
Hazard Tree Removal and Right Tree-Right Place	Inspection and Maintenance	lines	$ -	$ -	D.16-06-054	PUC § 451, GO 95, PRC §§ 4292 and 4293, NERC FAC-003-4	TY2019 GRC	TTBA	Yes		
Pole Brushing	Inspection and Maintenance	lines	$ -	$ -	D.16-06-054	PRC § 4292	TY2019 GRC	-	Yes		
Electric Equipment Training	Inspection and Maintenance	lines	$ -	$0.024 - $0.036	No	PUC § 451	TY2019 GRC	-	No		
Red Flag Operations	Inspection and Maintenance	lines	$ -	$0.30 - $0.90	No	GO 95, PRC §§ 4292 and 4293, NERC FAC-003-4	-	-	No		
SITUATIONAL AWARENESS										% of weather stations operational during RFW or extreme FPI	Refer to Section 6.2 of Wildfire Mitigation Plan
Fire Science and Climate Adaptation Department	Situational/Conditional Awareness	various	$ -	$1.6 - $2.4	D.16-06-054	PUC § 451	TY2019 GRC	-	No		
Meterological Capabilities and Technologies	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Fire Potential Index	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Santa Ana Wildfire Threat Index	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Wildfire Risk Reduction Model - Operational System	Situational/Conditional Awareness	various	$0.3 - $0.5	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Camera Networks and Fire Dectection	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Climate Change Adaptation	Situational/Conditional Awareness	various	$ -	$ -	D.16-06-054	PUC § 451	-	-	Yes		
Wireless Fault Indicators	Situational/Conditional Awareness	fault indicators	$0.48 - $0.72	$ -	D.16-06-054	PUC § 451	TY2019 GRC	-	Yes		
Advanced Weather Station Integration and Forecast	Situational/Conditional Awareness	various	$0.5 - $0.7	$ -	No	PUC § 451	TY2019 GRC	-	No		

Wildfire Mitigation Strategies and Programs [1]

Program / Strategy	Categories: (1) Design and Construction, (2) Inspection and Maintenance, (3) Operational Practices, (4) Situational/Conditional Awareness, and/or (5) Response and Recovery	Asset Addressed (Ex: line, poles, etc.)	2019 Cost Estimate - Direct Capital (2019$ in MM)[2]	2019 Cost Estimate - Incremental O&M (2019$ in MM)[3]	Costs Currently Reflected in Revenue Requirement? (Provide Decision Reference)[4]	Compliance Requirement? (Provide code or GO reference)[5]	Identify any Aspects of Plan/Strategy and Associated Funding That Is or Will Be Addressed in Another Case (Identify Case)[6]	Identify Any Memorandum Accounts Where Costs of Program/Strategy Are Being Tracked and Explain How Double Tracking Is Prevented[7]	Previously included in RAMP? (Provide Reference)[8]	Evaluation Metric(s)[9]	Assumptions Underlying Metric[10]
PUBLIC SAFETY POWER SHUTOFF										% of PSPS impacted metered customers notified of the potential PSPS in advance	Refer to Section 6.2 of Wildfire Mitigation Plan
Strategy for MinimizIng Public Safety Risk	Operation Practices	various	$ -	$ -	D.16-06-054	D.12-04-024, Res ESRB-8, PUC §§ 399.2(a) and 451	TY2019 GRC	-	No		
Public Safety Power Shutoff Protocols	Operation Practices	various	$ -	$ -	D.16-06-054	D.12-04-024, Res ESRB-8, PUC §§ 399.2(a) and 451	TY2019 GRC	-	No		
Communication Practices	Operation Practices	various	$0.50 - $0.70	$2.0 - $3.0	D.16-06-054	D.12-04-024, Res ESRB-8, PUC §§ 399.2(a) and 451	TY2019 GRC	-	Yes		
Mitigating the Public Safety Impact of PSPS Protocols	Operation Practices/Recovery and Response	various	$ -	$ -	D.16-06-054	D.12-04-024, Res ESRB-8, PUC §§ 399.2(a) and 451	TY2019 GRC	-	Yes		

NOTES:

[1] This table summarizes the detailed information provided in Section 4 of SDG&E's Wildfire Mitigation Plan.

[2] Reflects capital cost estimates for 2019, see Appendix A for additional information including cost estimates for 2019 and 2020. Since projects generally span several years, considering capital costs over a limited timeframe (e.g., one year) typically does not represent the entire mitigation.

[3] Reflects O&M cost estimates for 2019 see Appendix A for additional information including cost estimates for 2019 and 2020. Total O&M costs are not available. SDG&E is presenting O&M cost estimates in this Plan relative to its 2018 authorized revenue requirement, which was established in the 2016 GRC and approved by the CPUC in D.16-06-054.

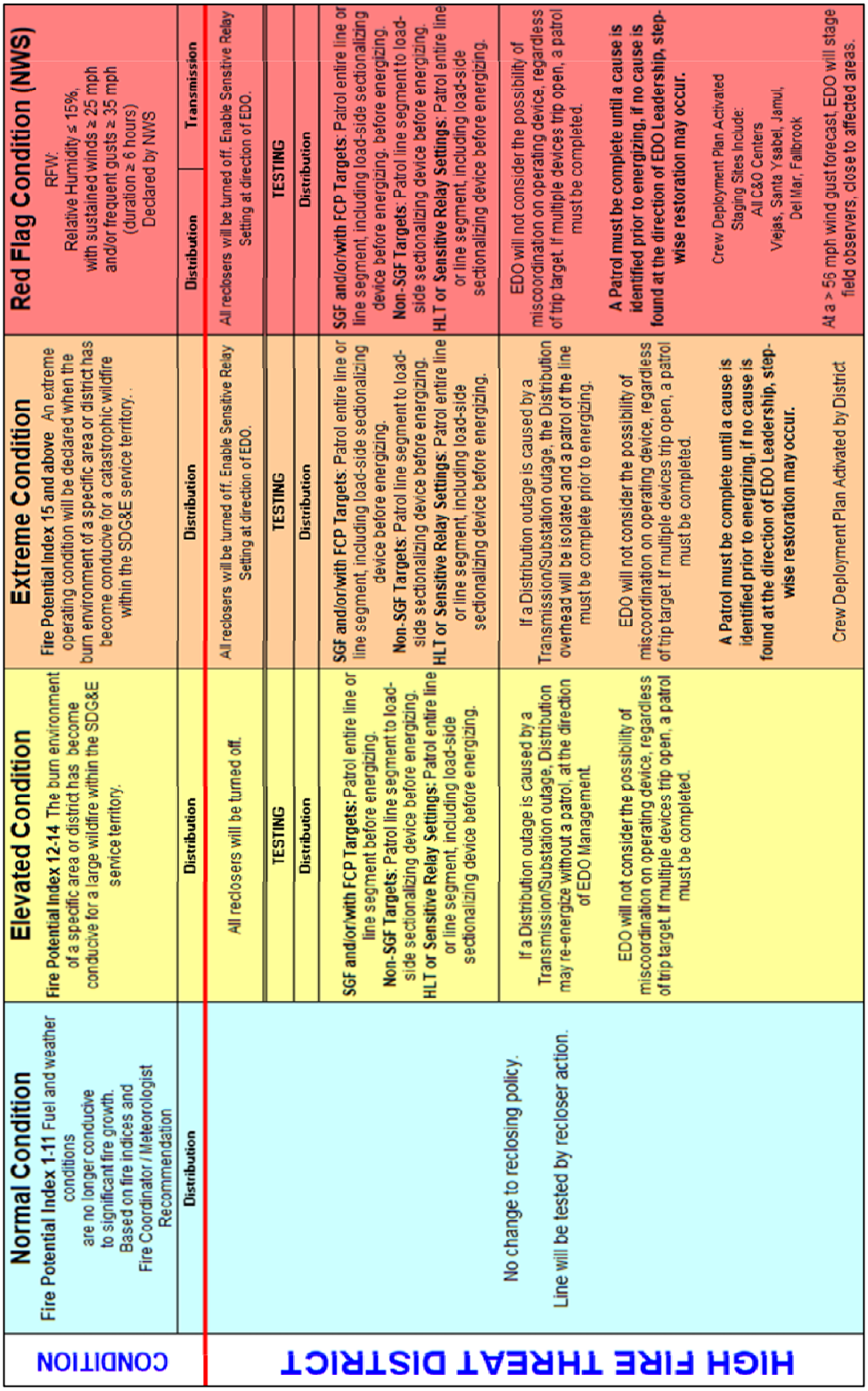
[4, 5, 6, 8] See Appendix A for details.

[7] SDG&E filed Advice Letter 3333-E to establish the Fire Risk Mitigation Memorandum Account (FRMMA), which is still pending before the CPUC . As such, no costs are being recorded in the FRMMA. SDG&E has established a General Rate Case Memorandum Account (GRCMA) to record the shortfall or overcollection resulting from the difference between the revenue requirement and corresponding rates in effect on January 1, 2019 and the final revenue requirement and corresponding rates adopted by the CPUC in a decision for A.17-10-007. Currently, no costs are being recorded in the GRCMA.

[9, 10] See Wildfire Mitigation Plan Section 6.2.

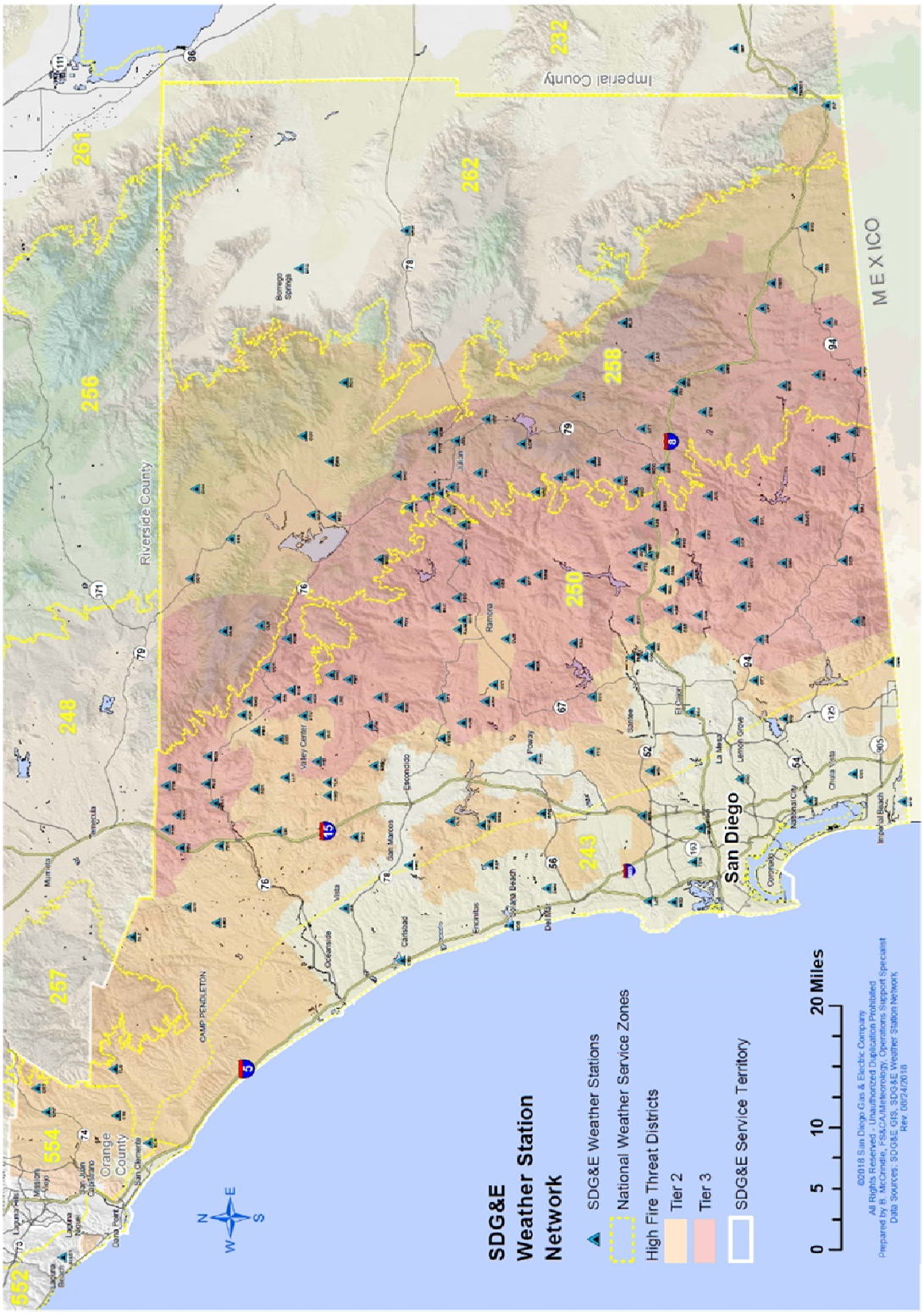
Appendix C

SDG&E Operating Conditions Chart



Appendix D

SDG&E Weather Station Networks



Appendix E

Fire Potential Index Components

FPI Green-Up Component

The state of native grasses, or Green-Up Component, of the FPI is determined using satellite data for various locations. This component is rated on a 0-to-5 scale ranging from very wet (or "lush") to very dry (or "cured"). The scale is tied to the Normalized Difference Vegetations Index (NDVI), which ranges from 0 to 1, as follows:

Very Wet/Lush: **0.65 to 1.00**	**0.60 to 0.64**	**0.55 to 0.59**	**0.50 to 0.54**	**0.40 to 0.49**	**Very Dry/Cured** **0 to 0.39**
0	1	2	3	4	5

FPI Fuels Component

The Fuels Component of the FPI measures the overall state of potential fuels which could support a wildfire. Values are assigned based on the overall state of available fuels (dead or live) for a fire using the following equation:

FC = FD / LFM

Where FC represents Fuels Component in the scale below, FD represents 10-hour Dead Fuel Moisture (using a 1-to-3 scale), and LFM represents Live Fuel Moisture (percentage).

The product of this equation represents the fuels component that is reflected in the FPI as follows:

Very Wet					**Very Dry**
1	**2**	**3**	**4**	**5**	**6**

FPI Weather Component

The weather component of the FPI represents a combination of sustained wind speeds and dew-point depression as determined using the following scale:

Dewpoint/Wind	≤5 knots	6 to 10	11 to 16	17 to 22	23 to 28	≥29 knots
≥50ºF	4	4	4	5	5	
40ºF to 49ºF	3	3	4	4	5	5
30ºF to 39ºF	3	3	3	4	4	5
20ºF to 29ºF	3	3	3	3	3	4
10ºF to 19ºF	2	2	2	2	2	3
<10ºF	0	1	1	1	1	2

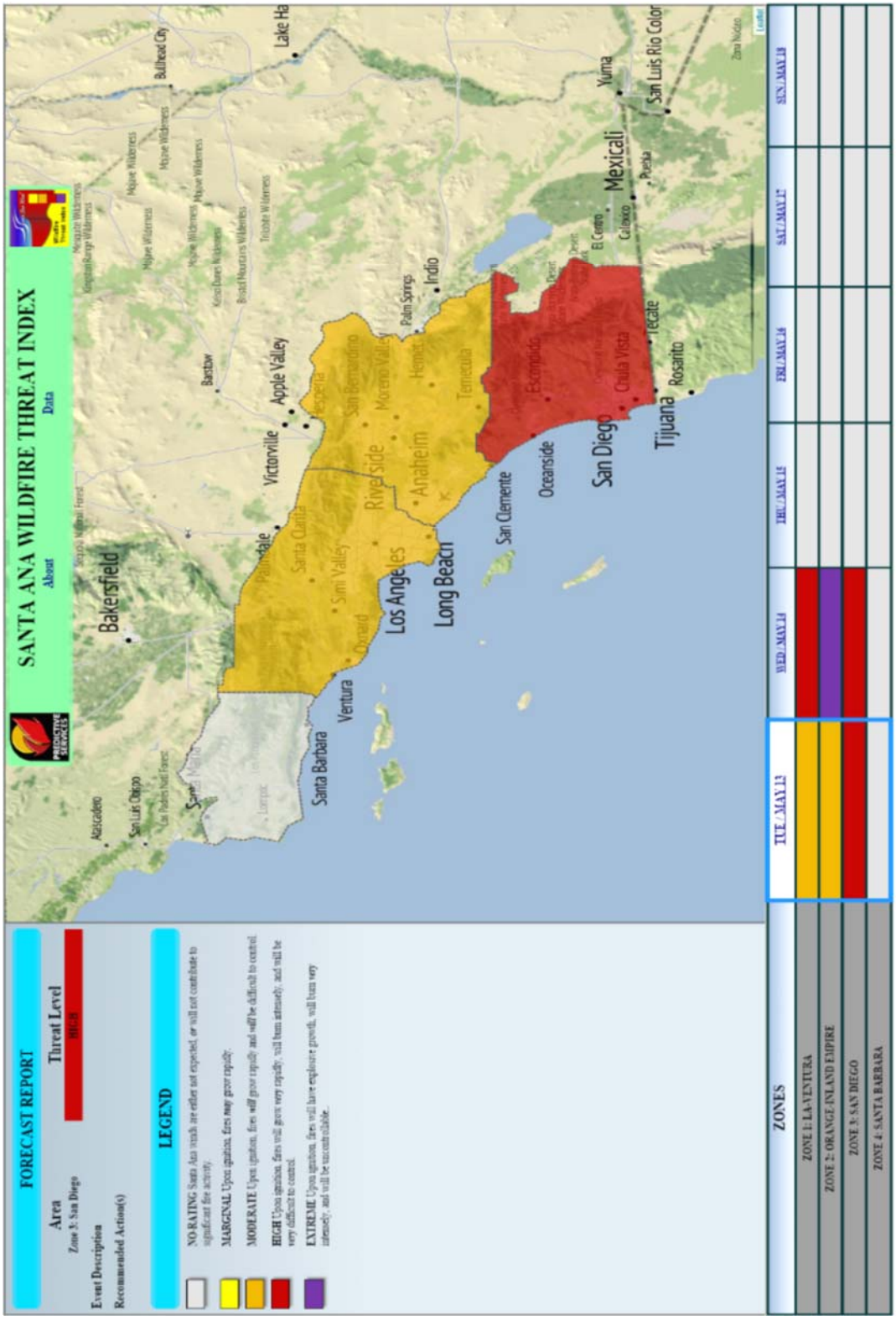
Final Computed Fire Potential Index

The individual numeric values representing the three variables reflected in the FPI, shown above, are combined and placed on the following scale:

Normal	Elevated	Extreme
≤ 11	**12 to 14**	**≥ 15**

Appendix F

Santa Ana Wildfire Threat Index



Appendix G

List of Priority Essential Services

Municipal Fire and Law Enforcement

City of Del Mar
City of El Cajon
City of Encinitas
City of Imperial Beach
City of La Mesa
City of Lemon Grove
City of National City
City of Poway
City of San Juan Capistrano
City of San Clemente
City of Carlsbad
City of Chula Vista
City of Coronado
City of Solana Beach
City of Vista
City of Dana Point
City of Mission Viejo
City of Escondido
City of Oceanside
City of San Marcos
City of San Diego
City of Santee
County of San Diego
County of Orange
State of California Highway Patrol

Non-Municipal Fire Departments

Alpine Fire Protection Dist.
Barona Fire Department
Bonita-Sunnyside Fire Protection
Borrego Springs Fire Department
Campo Band of Mission Indians Fire Department
Cal Fire
Deer Springs Fire Protection
Julian Cuyamaca Fire District
Lakeside Fire Protection
Manzanita Fire Department
Mesa Grande Band of Mission Indians Fire Department
North County Fire
Pala Band of Mission Indians Fire Department
Pauma Band of Mission Indians Fire Department
Rancho Santa Fe Fire Department
Rincon Fire Department
San Miguel Fire Protection District
Sycuan Kumeyaay Indians Fire Department
Viejas Band of Kumeyaay Indians Fire Department
Valley Center Fire Protection

Communication Providers

AT&T
Clear Channel Radio DIP
Cox Communications Inc.
KNSD
KBNT Channel 17
Midwest TV Inc
Sprint Nextel Corporation
Time Warner Cable
T-Mobile USA Inc
U S Sprint Co
Verizon Wireless

Hospitals

Scripps Media Inc
Alvarado Hospital
Coronado Hospital
Grossmont Hospital
Kaiser Permanente
Mercy Hospital and Medical Center
Mission Hospital
Palomar Pomerado Health
Paradise Valley Hospital
Rady Children's Hospital
Saddleback Memorial Medical Center
Scripps Mercy Hospital – Chula Vista
Sharp Chula Vista – Medical Center
Sharp Memorial Hospital
Tri City Medical Center
UCSD Medical Center
VA Medical Center

Water Utilities/Agencies/Waste Water

Borrego Water District
Descanso Comm. Water Dist.
Fallbrook Public Utility District
Harrison Park Mutual Water Co.
Helix Water District
Julian Comm. Service District
Lakeside Water District
Leucadia Co. Water Dist.
Moulton Niguel Water Dist.
Municipal Water Dist.
Olivenhain Municipal Water District
Otay Water District
Padre Dam Mun. Water Dist.
Palomar Mtn. Mun. Water Dist.
Rainbow Mu. Water Dist.
Rancho Pauma Mtg. Water Co.
San Dieguito Water Dist.
San Elijo Joint Powers Authority
San Diego County Water Authority
South Coast Water District
South Orange County Wastewater Authority
San Diego Metropolitan Wastewater Department
Santa Margarita Water Dist.
Sweetwater Authority
Vallecitos Water Dist.
Vista Irrigation Dist.
Valley Center Mun Water Dist.
Yuima Mun. Water Dist.

Schools

Alpine Union School District
Bonsall Union School District
Borrego Unified School District
Cajon Valley Union School District
Cardiff School District
Carlsbad Unified School District
Dehesa Elementary School District
Escondido Union High School District
Escondido Union School District
Fallbrook Union High School District
Fallbrook Union School District
Grossmont Union High School District
Jamul-Dulzura School District
Julian Charter School
Julian Union High School District
Julian Union School District
Lakeside Union School District
Mountain Empire Unifieid School District
Ramona Unified School District
San Diego Unified School District
San Pasqual Union School District
SD County Office of Education
Spencer Valley School
Vallecitos School District
Valley Center/Pauma Unified School District