San Diego Gas & Electric Company's Quarterly Report on 2020 Wildfire Mitigation Plan for Q3 2020

September 9, 2020

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I. Introduction

Pursuant to Ordering Paragraph (OP) 8 of California Public Utilities Commission (Commission or CPUC) Resolution WSD-002, San Diego Gas & Electric Company (SDG&E or Company) submits its first Quarterly Report (QR or Report) on 2020 Wildfire Mitigation Plan (WMP) for Q3 2020.[1] A copy of this report is being provided to the Director of the Commission's Wildfire Safety Division (WSD), served to the California Department of Forestry and Fire Protection (CAL FIRE), and the service list of Rulemaking (R.) 18-10-007.

In this QR, SDG&E addresses the 24 Class B Deficiencies from its 2020 WMP, 14 specific to SDG&E and 10 that are applicable to all electric utilities. SDG&E provides the information sought, and describes the steps it has taken or is taking to comply with the Class B deficiencies that the WSD identified in Resolutions WSD-002 and WSD-005.[2] In addition, SDG&E provides an update on its Class A deficiency (SDG&E-13) providing a comparison of electric reliability performance near vegetation at different post trim clearance ranges.

To aid with the understanding of this QR and how SDG&E is responding to the deficiencies that specifically tie to its 2020 WMP initiatives, SDG&E reorganized its initiatives for this Report based on ability to track costs separately. For example, SDG&E was able to break out detailed inspections, intrusive inspections, and patrol inspections under the WSD's Asset Management and Inspections category to better align with requirements. But in the Risk Assessment and Mapping category, SDG&E only has one tool with one associated cost to create the various risk maps associated with the Risk Assessment and Mapping section. In certain instances, such as updates to grid topology, SDG&E has multiple, separate programs that fall under that one WSD category. In those cases, SDG&E presents all programs separately (see programs C17.1-C17.8).

Overall, SDG&E presents a total of 52 initiatives with specific IDs that tie back to the categories they belong to per the 2020 WMP. The list of 52 initiatives with their IDs is provided in the following table.

ID	WMP Category	Program/Initiative
A.1	A. Risk Assessment and Mapping	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment
B.1	B. Situational Awareness and Forecasting	Advanced weather monitoring and weather stations
B.3	B. Situational Awareness and Forecasting	Fault indicators for detecting faults on electric lines and equipment

[1] Resolution WSD-002, Guidance Resolution on 2020 Wildfire Mitigation Plans Pursuant to Public Utilities Code Section 8386 (June 11, 2020) at p. 45-46, Ordering Paragraph 8.

[2] SDG&E also provides an update and supplemental information regarding one Class A Deficiency, SDGE-13.

ID	WMP Category	Program/Initiative
B.4	B. Situational Awareness and Forecasting	Forecast of fire risk index, fire potential index, or similar
C.1	C. Grid Design and System Hardening	Capacitor maintenance and replacement program
C.2	C. Grid Design and System Hardening	Circuit breaker maintenance and installation to de-energize lines upon detecting a fault
C.3	C. Grid Design and System Hardening	Covered conductor installation
C.6	C. Grid Design and System Hardening	Distribution pole replacement and reinforcement, including with composite poles
C.7	C. Grid Design and System Hardening	Expulsion fuse replacement
C.8.1	C. Grid Design and System Hardening	Grid topology improvements to mitigate or reduce PSPS events (sectionalizing devices)
C.8.2	C. Grid Design and System Hardening	Grid topology improvements to mitigate or reduce PSPS events (Micro Grids)
C.10	C. Grid Design and System Hardening	Maintenance, repair, and replacement of connectors, including hotline clamps
C.11.3	C. Grid Design and System Hardening	Mitigation of impact on customers and other residents affected during PSPS event (Generator Grant Program)
C.11.1	C. Grid Design and System Hardening	Mitigation of impact on customers and other residents affected during PSPS event (Whole Home Generator Program)
C.11.2	C. Grid Design and System Hardening	Mitigation of impact on customers and other residents affected during PSPS event (customer resiliency programs)
C.16	C. Grid Design and System Hardening	Undergrounding of electric lines and/or equipment
C.17.1	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in the high fire threat districts (HFTDs) (Distribution OH Hardening)
C.17.2	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH Hardening)
C.17.3	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission UG Hardening)
C.17.4	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH distribution underbuilt)
C.17.5	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Transmission OH)
C.17.6	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution underbuilt on Transmission OH)
C.17.7	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution OH)
C.17.8	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution UG)
C.18.1	C. Grid Design and System Hardening	Other (Lightning Arrestor Replacement Program)
C.18.2	C. Grid Design and System Hardening	Other (LTE Communication Network)

ID	WMP Category	Program/Initiative
D.1	D. Asset Management and Inspections * (Follow up costs for CMP)	Detailed inspections of distribution electric lines and equipment
D.2	D. Asset Management and Inspections	Detailed inspections of transmission electric lines and equipment
D.4	D. Asset Management and Inspections	Infrared inspections of distribution electric lines and equipment
D.6	D. Asset Management and Inspections	Intrusive pole inspections
D.9.1	D. Asset Management and Inspections	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (HFTD Tier 3 Inspections)
D.9.2	D. Asset Management and Inspections	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone flights and assessments)
D.9.4	D. Asset Management and Inspections	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone Repairs)
D.9.3	D. Asset Management and Inspections	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Circuit Ownership)
D.11	D. Asset Management and Inspections	Patrol inspections of distribution electric lines and equipment
D.15	D. Asset Management and Inspections	Substation inspections
E.2	E. Vegetation Management and Inspections	Detailed inspections of vegetation around distribution electric lines and equipment
E.5	E. Vegetation Management and Inspections	Fuel management and reduction of “slash” from vegetation management activities
E.9	E. Vegetation Management and Inspections	Other discretionary inspections of vegetation around distribution electric lines and equipment
E.20	E. Vegetation Management and Inspections	Vegetation management to achieve clearances around electric lines and equipment (Pole Brushing)
F.1	F. Grid Operations and Protocols	Automatic recloser operations
F.2	F. Grid Operations and Protocols	Crew-accompanying ignition prevention and suppression resources and services
F.3	F. Grid Operations and Protocols	Personnel work procedures and training in conditions of elevated fire risk
F.6.2	F. Grid Operations and Protocols	PSPS events and mitigation of PSPS impacts (Communication practices)
F.5.1	F. Grid Operations and Protocols	Stationed and on-call ignition prevention and suppression resources and services (Industrial Fire Brigade)

ID	WMP Category	Program/Initiative
F.6.1	F. Grid Operations and Protocols	Stationed and on-call ignition prevention and suppression resources and services (Aviation Firefighting Program)
G.1	G. Data Governance	Centralized repository for data
G.4	G. Data Governance	Tracking and analysis of near miss data
H.1.1	H. Resource Allocation Methodology	Allocation methodology development and application
H.1.2	H. Resource Allocation Methodology	Allocation methodology development and application - (Wildfire Mitigation Personnel)
H.1.3	H. Resource Allocation Methodology	Allocation methodology development and application (PSPS Mitigation Engineering Team)
I.1	I. Emergency Planning and Preparedness	Adequate and trained workforce for service restoration (EOC)

II. Resolution WSD-002 – Class B Guidance Deficiencies

A. Condition Guidance-1: Lack of Risk Spend Efficiency Information

In its first quarterly report, each electrical corporation shall provide the following:

i. its calculated reduction in ignition risk for each initiative in its 2020 WMP;
ii. its calculated reduction in wildfire consequence risk for each initiative in its 2020 WMP;
iii. and the risk models used to calculate (i) and (ii) above.

Overview of Approach to Provide Risk Reductions

The model SDG&E used to calculate estimated risk reductions is the same one used to calculate its Risk Spend Efficiencies (RSEs) as described in both its 2019 Risk Assessment Mitigation Phase RAMP proceeding,[3] as well as the 2020 WMP. For more details about the model itself, please refer to chapters RAMP-C, RAMP-D and SDG&E-1 in the 2019 RAMP report.[4]

As described in SDG&E's comments to the 2020 WMP draft resolutions,[5] not all initiatives can have a direct impact on reducing risk, and it is difficult to calculate a risk reduction for some initiatives. For example, initiatives such as resource allocation methodology development or establishment of a data governance do not have direct impacts on reducing ignitions, however, they do provide foundational and necessary support to inform SDG&E's direct risk mitigations such as hardening and vegetation management. With that in mind, SDG&E took a closer look at all its WMP initiatives and categorized them as follows to address this deficiency:

- **Foundational Supporting Wildfire Risk Mitigation**
  SDG&E has eight initiatives that do not directly mitigate fire risk, but are critical to the ability to mitigate the risk. Foundational supporting initiatives are not easy to tie to one specific mitigation as they serve many mitigation activities. For these initiatives, SDG&E provides qualitative descriptions of their benefits and explains how they support the wildfire mitigation program.

- **Direct Wildfire Risk Mitigation**
  There are 39 initiatives that can be directly tied to mitigating fire risk and for which SDG&E can provide estimated risk reduction calculations. Where applicable, individual risk reduction calculations are provided for each of these initiatives. In some instances, however, there are initiatives that need to remain grouped because certain mitigations depend on them and one cannot be done without the other. An example of this is the LTE Network initiative, which would not be done in isolation from the Advanced

[3] Investigation (I.) 19-11-011.

[4] https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M326/K933/326933842.PDF.

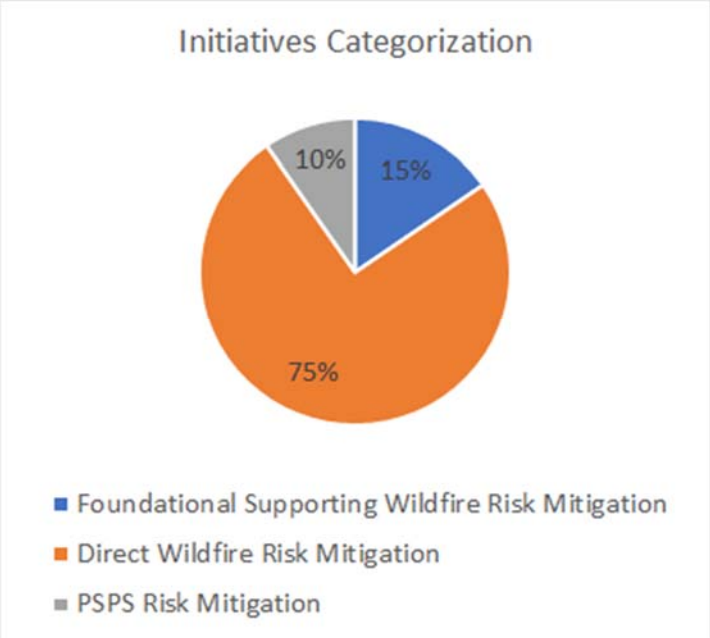
[5] San Diego Gas & Electric Company's Comments on Draft Resolutions WSD-002 and WSD-005 Regarding the 2020 Wildfire Mitigation Plans (May 27, 2020); available at: ftp://ftp.cpuc.ca.gov/WMP/PublicComments_Resolutions/SDGE%20to%20WSD%20re%20WMP%20Resolutions%20-%20comments%20-%2020200527.pdf.

Protections initiatives, and it would not make sense to try to calculate an ignition risk reduction for one without the other. As a part of reviewing this information, it is important to note that the provided estimates are done on an individual initiative basis to understand the effect of each initiative on its own merit.

- **Public Safety Power Shutoff Risk Mitigation**
  This category is for the five initiatives that are geared towards mitigating Public Safety Power Shutoff (PSPS) impacts. Because this deficiency focuses on calculating reductions on wildfire risk, initiatives in this category will not have a calculated reduction because they target a different risk (the risk associated with PSPS). In SDG&E's future WMP update, SDG&E plans to take into account consequences of PSPS in which case a calculated risk reduction for PSPS mitigation activities would be provided.

The following figure depicts the breakdown of SDG&E's initiatives categorization:

Guidance-1 Figure 1



In addition to this categorization approach, SDG&E provides further details to distinguish between the benefit of existing initiatives (controls) that have been implemented for a long time and ones that are relatively newer or have expanded in scope (mitigations). In the case of "controls" (or initiatives that have been in place for many years), no additional risk reductions may be realized, but the risk could increase if they were to stop. These types of initiatives generally help SDG&E maintain the current risk level rather than reduce it further. Instead of providing a calculated risk reduction, SDG&E provides a potential risk increase if the initiative were to stop.

On the other hand, “mitigations” (or initiatives that are newer or include expanded scope beyond the status quo) have additional risk reduction benefits, and for those SDG&E can calculate a risk reduction estimate. In some cases, initiatives can include a scope that is considered a “control” as well as additional scope that would be considered a “mitigation” in which case, calculated risk reductions as well as potential risk increases are provided. For purposes of this Report, SDG&E may refer to risk reductions or potential risk increases generally as “benefits” of risk mitigations. The distinction between whether they are reductions or potential increases is broken out in the tables of initiatives below.

Finally, the Guidance-1 condition does not provide directions regarding what the timeframe should be for the calculations requested. As such, SDG&E provides specific timeframe estimates based on the type of initiative. For instance, if the initiative is one that involves replacement of assets, the benefit of such replacements would be realized throughout the life of the asset whereas initiatives that are more operational in nature have a shorter timeframe.

The table below provides a full list of initiatives and how they are categorized (e.g., foundational supporting, direct, or PSPS). The following sections of this deficiency will be organized by the three categories in this table.

Guidance-1 Table 1
Mitigation Category of Initiatives

ID	WMP Category	Program/Initiative	Mitigation Category
A.1	A. Risk Assessment and Mapping	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	Foundational Supporting Wildfire Risk Mitigation
B.1	B. Situational Awareness and Forecasting	Advanced weather monitoring and weather stations	Foundational Supporting Wildfire Risk Mitigation
B.3	B. Situational Awareness and Forecasting	Fault indicators for detecting faults on electric lines and equipment	Foundational Supporting Wildfire Risk Mitigation
B.4	B. Situational Awareness and Forecasting	Forecast of fire risk index, fire potential index, or similar	Foundational Supporting Wildfire Risk Mitigation
C.1	C. Grid Design and System Hardening	Capacitor maintenance and replacement program	Direct Wildfire Risk Mitigation
C.2	C. Grid Design and System Hardening	Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	Direct Wildfire Risk Mitigation
C.3	C. Grid Design and System Hardening	Covered conductor installation	Direct Wildfire Risk Mitigation
C.6	C. Grid Design and System Hardening	Distribution pole replacement and reinforcement, including with composite poles	Direct Wildfire Risk Mitigation
C.7	C. Grid Design and System Hardening	Expulsion fuse replacement	Direct Wildfire Risk Mitigation
C.8.1	C. Grid Design and System Hardening	Grid topology improvements to mitigate or reduce PSPS events (sectionalizing devices)	PSPS Risk Mitigation
C.8.2	C. Grid Design and System Hardening	Grid topology improvements to mitigate or reduce PSPS events (Micro Grids)	PSPS Risk Mitigation
C.10	C. Grid Design and System Hardening	Maintenance, repair, and replacement of connectors, including hotline clamps	Direct Wildfire Risk Mitigation
C.11.3	C. Grid Design and System Hardening	Mitigation of impact on customers and other residents affected during PSPS event (Generator Grant Program)	PSPS Risk Mitigation
C.11.1	C. Grid Design and System Hardening	Mitigation of impact on customers and other residents affected during PSPS event (Whole Home Generator Program)	PSPS Risk Mitigation

ID	WMP Category	Program/Initiative	Mitigation Category
C.11.2	C. Grid Design and System Hardening	Mitigation of impact on customers and other residents affected during PSPS event (customer resiliency programs)	PSPS Risk Mitigation
C.16	C. Grid Design and System Hardening	Undergrounding of electric lines and/or equipment	Direct Wildfire Risk Mitigation
C.17.1	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (Distribution OH Hardening)	Direct Wildfire Risk Mitigation
C.17.2	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH Hardening)	Direct Wildfire Risk Mitigation
C.17.3	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission UG Hardening)	Direct Wildfire Risk Mitigation
C.17.4	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH distribution underbuilt)	Direct Wildfire Risk Mitigation
C.17.5	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Transmission OH)	Direct Wildfire Risk Mitigation
C.17.6	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution underbuilt on Transmission OH)	Direct Wildfire Risk Mitigation
C.17.7	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution OH)	Direct Wildfire Risk Mitigation
C.17.8	C. Grid Design and System Hardening	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution UG)	Direct Wildfire Risk Mitigation
C.18.1	C. Grid Design and System Hardening	Other (Lightning Arrestor Replacement Program)	Direct Wildfire Risk Mitigation
C.18.2	C. Grid Design and System Hardening	Other (LTE Communication Network)	Direct Wildfire Risk Mitigation
D.1	D. Asset Management and Inspections * (Follow up costs for CMP)	Detailed inspections of distribution electric lines and equipment	Direct Wildfire Risk Mitigation
D.2	D. Asset Management and Inspections	Detailed inspections of transmission electric lines and equipment	Direct Wildfire Risk Mitigation
D.4	D. Asset Management and Inspections	Infrared inspections of distribution electric lines and equipment	Direct Wildfire Risk Mitigation
D.6	D. Asset Management and Inspections	Intrusive pole inspections	Direct Wildfire Risk Mitigation
D.9.1	D. Asset Management and Inspections	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (HFTD Tier 3 Inspections)	Direct Wildfire Risk Mitigation

ID	WMP Category	Program/Initiative	Mitigation Category
D.9.2	D. Asset Management and Inspections	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone flights and assessments)	Direct Wildfire Risk Mitigation
D.9.4	D. Asset Management and Inspections	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone Repairs)	Direct Wildfire Risk Mitigation
D.9.3	D. Asset Management and Inspections	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Circuit Ownership)	Direct Wildfire Risk Mitigation
D.11	D. Asset Management and Inspections	Patrol inspections of distribution electric lines and equipment	Direct Wildfire Risk Mitigation
D.15	D. Asset Management and Inspections	Substation inspections	Direct Wildfire Risk Mitigation
E.2	E. Vegetation Management and Inspections	Detailed inspections of vegetation around distribution electric lines and equipment	Direct Wildfire Risk Mitigation
E.5	E. Vegetation Management and Inspections	Fuel management and reduction of "slash" from vegetation management activities	Direct Wildfire Risk Mitigation
E.9	E. Vegetation Management and Inspections	Other discretionary inspections of vegetation around distribution electric lines and equipment	Direct Wildfire Risk Mitigation
E.20	E. Vegetation Management and Inspections	Vegetation management to achieve clearances around electric lines and equipment (Pole Brushing)	Direct Wildfire Risk Mitigation
F.1	F. Grid Operations and Protocols	Automatic recloser operations	Direct Wildfire Risk Mitigation
F.2	F. Grid Operations and Protocols	Crew-accompanying ignition prevention and suppression resources and services	Direct Wildfire Risk Mitigation
F.3	F. Grid Operations and Protocols	Personnel work procedures and training in conditions of elevated fire risk	Direct Wildfire Risk Mitigation
F.6.2	F. Grid Operations and Protocols	PSPS events and mitigation of PSPS impacts (Communication practices)	Direct Wildfire Risk Mitigation
F.5.1	F. Grid Operations and Protocols	Stationed and on-call ignition prevention and suppression resources and services (Industrial Fire Brigade)	Direct Wildfire Risk Mitigation
F.6.1	F. Grid Operations and Protocols	Stationed and on-call ignition prevention and suppression resources and services (Aviation Firefighting Program)	Direct Wildfire Risk Mitigation

ID	WMP Category	Program/Initiative	Mitigation Category
G.1	G. Data Governance	Centralized repository for data	Foundational Supporting Wildfire Risk Mitigation
G.4	G. Data Governance	Tracking and analysis of near miss data	Foundational Supporting Wildfire Risk Mitigation
H.1.1	H. Resource Allocation Methodology	Allocation methodology development and application	Foundational Supporting Wildfire Risk Mitigation
H.1.2	H. Resource Allocation Methodology	Allocation methodology development and application - (Wildfire Mitigation Personnel)	Foundational Supporting Wildfire Risk Mitigation
H.1.3	H. Resource Allocation Methodology	Allocation methodology development and application (PSPS Mitigation Engineering Team)	Foundational Supporting Wildfire Risk Mitigation
I.1	I. Emergency Planning and Preparedness	Adequate and trained workforce for service restoration (EOC)	Direct Wildfire Risk Mitigation

Foundational Supporting Wildfire Risk Mitigation

The following table contains mitigation initiatives that have been categorized as Foundational Supporting Wildfire Risk Mitigation initiatives. SDG&E provides a qualitative description of how these initiatives help with managing the wildfire risk.

Guidance-1 Table 2
Foundational Supporting Wildfire Risk Mitigation

ID	Program/Initiative	Qualitative Benefit Description
A.1	A. Risk Assessment and Mapping	While risk mapping models such as WRRM do not directly reduce the risk of ignitions, they offer critical insights to guide both operational and strategic long-term decision-making because of the advanced wildfire risk assessment and mapping capabilities they offer.
B.1	Advanced weather monitoring and weather stations	Situational awareness is a critical foundational element of SDG&E's ability to mitigate the risk of wildfires across its service territory. Tools such as the camera network, fire-related indices, weather stations and dashboards all provide important information that guides the Company's operations during fire season and are critical elements that inform the targeted application of PSPS. They also provide valuable information to inform inspections as well as targeting of capital investments in the system to reduce the risk of wildfires.
B.4	Forecast of fire risk index, fire potential index, or similar	
B.3	Fault indicators for detecting faults on electric lines and equipment	Wireless fault indicators are critical to identifying where system failures have occurred thereby reducing the time needed to dispatch crews to address those failures.
G.4	Tracking and analysis of near miss data	Enhanced tracking of data to better understand ignition causes supports SDG&E's continued focus on data-driven decision-making. Establishing a data governance program will lead to better insights, transparency and increased granularity and quantification in wildfire-related assessments.
H.1.1	Allocation methodology development and application	Continuing to enhance SDG&E's resource allocation methodologies enables the use of better information to guide decision-making and creates a more transparent, consistent and repeatable process to inform resource allocations across the Company's portfolio of wildfire mitigations. Enhancing decision-making ultimately leads to better targeting of high-risk areas and optimizing the Company's spend to reduce the most wildfire risk at the least cost.
H.1.2	Allocation methodology development and application - (Wildfire Mitigation Personnel)	
H.1.3	Allocation methodology development and application (PSPS Mitigation Engineering Team)	

Direct Wildfire Risk Mitigation

The following table contains mitigation initiatives that have been categorized as directly contributing to wildfire risk mitigation. Estimated benefits of each initiative based on amount of work to be performed are provided in the table below. In most cases, SDG&E was able to calculate an individual "benefit" for each initiative, but in rare instances, some initiatives required some level of grouping because they cannot be performed or viewed independently of one another.

Guidance-1 Table 3
Direct Wildfire Risk Mitigation

ID	Program/Initiative	Mitigations (New)		Controls (Existing)		Timeline of Ignition Reduction Calculations (Years)
		Calculated reduction in ignition risk for each initiative in its 2020 WMP	Calculated reduction in wildfire consequence risk for each initiative in its 2020 WMP	Calculated increase in ignition risk if initiative is stopped	Calculated increase in wildfire consequence risk if initiative is stopped	
C.2	Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	5.83%	N/A	N/A	N/A	9
C.18.2	Other (LTE Communication Network)					
D.9.2	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone flights and assessments)	1.25%	N/A	N/A	N/A	1
D.9.4	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone Repairs)					
D.6	Intrusive pole inspections	N/A	N/A	0.77%	N/A	1

ID	Program/Initiative	Mitigations (New)		Controls (Existing)		Timeline of Ignition Reduction Calculations (Years)
		Calculated reduction in ignition risk for each initiative in its 2020 WMP	Calculated reduction in wildfire consequence risk for each initiative in its 2020 WMP	Calculated increase in ignition risk if initiative is stopped	Calculated increase in wildfire consequence risk if initiative is stopped	
C.6	Distribution pole replacement and reinforcement, including with composite poles					
F.6.2	PSPS events and mitigation of PSPS impacts (Communication practices)	N/A	N/A	50%	N/A	3
G.1	Centralized repository for data					
I.1	Adequate and trained workforce for service restoration (EOC)					
C.1	Capacitor maintenance and replacement program	0.30%	N/A	N/A	N/A	15
C.17.1	Updates to grid topology to minimize risk of ignition in HFTDs (Distribution OH Hardening)	1.58%	N/A	N/A	N/A	40
C.3	Covered conductor installation	0.42%	N/A	N/A	N/A	40
C.7	Expulsion fuse replacement	0.35%	N/A	N/A	N/A	40
C.10	Maintenance, repair, and replacement of connectors, including hotline clamps	0.09%	N/A	N/A	N/A	40
C.16	Undergrounding of electric lines and/or equipment	5.18%	N/A	N/A	N/A	40
C.17.2	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH Hardening)	0.22%	N/A	N/A	N/A	3
C.17.3	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission UG Hardening)	0.03%	N/A	N/A	N/A	3
C.17.4	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH distribution underbuilt)	0.08%	N/A	N/A	N/A	3
C.17.5	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Transmission OH)	0.10%	N/A	N/A	N/A	3

ID	Program/Initiative	Mitigations (New)		Controls (Existing)		Timeline of Ignition Reduction Calculations (Years)
		Calculated reduction in ignition risk for each initiative in its 2020 WMP	Calculated reduction in wildfire consequence risk for each initiative in its 2020 WMP	Calculated increase in ignition risk if initiative is stopped	Calculated increase in wildfire consequence risk if initiative is stopped	
C.17.6	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution underbuilt on Transmission OH)	0.05%	N/A	N/A	N/A	3
C.17.7	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution OH)	0.68%	N/A	1.10%	N/A	40
C.17.8	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution UG)	0.42%	N/A	N/A	N/A	40
C.18.1	Other (Lightning Arrestor Replacement Program 5.3.3.18)	0.61%	N/A	N/A	N/A	30
D.1	Detailed inspections of distribution electric lines and equipment	N/A	N/A	2.10%	N/A	1
D.2	Detailed inspections of transmission electric lines and equipment	N/A	N/A	0.41%	N/A	1
D.4	Infrared inspections of distribution electric lines and equipment	0.07%	N/A	N/A	N/A	1
D.9.1	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (HFTD Tier 3 Inspections)	N/A	N/A	0.50%	N/A	1
D.9.3	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Circuit Ownership)	0.00007%	N/A	N/A	N/A	1

ID	Program/Initiative	Mitigations (New)		Controls (Existing)		Timeline of Ignition Reduction Calculations (Years)
		Calculated reduction in ignition risk for each initiative in its 2020 WMP	Calculated reduction in wildfire consequence risk for each initiative in its 2020 WMP	Calculated increase in ignition risk if initiative is stopped	Calculated increase in wildfire consequence risk if initiative is stopped	
D.15	Substation inspections[6]	0	0	0	0	N/A
E.2	Detailed inspections of vegetation around distribution electric lines and equipment	N/A	N/A	50%	N/A	1
E.5	Fuel management and reduction of "slash" from vegetation management activities	0.38%	N/A	N/A	N/A	1
E.9	Other discretionary inspections of vegetation around distribution electric lines and equipment	5%	N/A	N/A	N/A	1
E.20	Vegetation management to achieve clearances around electric lines and equipment (Pole Brushing)	N/A	N/A	7.24%	N/A	1
F.1	Automatic recloser operations	N/A	N/A	4.55%	N/A	1
F.2	Crew-accompanying ignition prevention and suppression resources and services	N/A	N/A	0.01%	N/A	1
F.3	Personnel work procedures and training in conditions of elevated fire risk	N/A	N/A	0.65%	N/A	1
F.6.1	Stationed and on-call ignition prevention and suppression resources and services (Aviation Firefighting Program)	N/A	4%	N/A	NA	8

[6] The way SDG&E designs and constructs its substations, with the steel structures and gravel and concrete base makes it difficult for a fire to spread outside the substation. With very little ignition history, SDG&E performs substation inspection and maintenance more for the importance of substation reliability.

ID	Program/Initiative	Mitigations (New)		Controls (Existing)		Timeline of Ignition Reduction Calculations (Years)
		Calculated reduction in ignition risk for each initiative in its 2020 WMP	Calculated reduction in wildfire consequence risk for each initiative in its 2020 WMP	Calculated increase in ignition risk if initiative is stopped	Calculated increase in wildfire consequence risk if initiative is stopped	
F.5.1	Stationed and on-call ignition prevention and suppression resources and services (Industrial Fire Brigade)	N/A	N/A	0.0000038%	N/A	1
D.11	Patrol inspections of distribution electric lines and equipment	N/A	N/A	2.4%	N/A	1

PSPS Risk Mitigation

The following table contains mitigation initiatives that have been categorized as PSPS mitigations. Because the deficiency focuses on providing an estimate in risk reduction for the wildfire risk, the calculated reductions to wildfire risk from these PSPS initiatives is zero. In lieu of that, SDG&E offers a brief description of the qualitative benefits of these initiatives that support a better implementation of PSPS which is a key component of wildfire mitigation.

Guidance-1 Table 4
PSPS Risk Mitigation

ID	Program/Initiative	Qualitative Benefits
C.8.1	Grid topology improvements to mitigate or reduce PSPS events (sectionalizing devices)	Sectionalizing devices enable a precise and targeted application of PSPS which allows SDG&E to minimize the impacts to customers when PSPS is needed to mitigate the wildfire risk
C.8.2	Grid topology improvements to mitigate or reduce PSPS events (Micro Grids)	Microgrids offer backup power sources to groups of customers which allow customers and communities to stay powered during high wind events when PSPS needs to be implemented
C.11.3	Mitigation of impact on customers and other residents affected during PSPS event (Generator Grant Program)	The Generator Grant Program offers medical baseline customers access to backup generation to remain powered during a PSPS event
C.11.1	Mitigation of impact on customers and other residents affected during PSPS event (Whole Home Generator Program)	Whole home generator solutions are additional solutions that can help reduce the impacts of PSPS to customers during fire season
C.11.2	Mitigation of impact on customers and other residents affected during PSPS event (customer resiliency programs)	Customer resiliency includes programs that provide backup power to medical baseline customers as well as critical infrastructure in addition to the community resource centers that are key to helping communities during PSPS

B. Condition Guidance-2: Lack of Alternatives Analysis for Chosen Initiatives

In its first quarterly report, each electrical corporation shall provide the following:

i. *all alternatives considered for each grid hardening or vegetation management initiative in its 2020 WMP;*
ii. *all tools, models, and other resources used to compare alternative initiatives;*
iii. *how it quantified and determined the risk reduction benefits of each initiative; and*
iv. *why it chose to implement each initiative over alternative options.*

Alternatives Analysis

The use of consistent risk modeling and RSEs when considering alternatives is in the early stages of development at SDG&E. Across the Company, various methodologies are utilized to determine the most optimal solutions to implement based on the specific types of issues each project or program is trying to address. For example, when SDG&E started its grid hardening efforts after the 2007 San Diego County fires, it invested in the development of a model (Wildfire Risk Reduction Model (WRRM)) that evaluates risk reductions at the asset level to produce a prioritized list of assets to harden based on their risk reduction and associated costs. In and of itself, that model offers an approach to alternatives analysis by determining which poles need to be mitigated through the program and which ones do not. Another example is SDG&E's efforts to address pole loading issues. The assessments involved in the determination of the optimal solutions utilize a different dataset to identify and rank pole loading issues and thus use a different model to consider solutions.

Most recently, in 2020, SDG&E began developing a consistent tool (Wildfire Next Generation System (WiNGS)) to utilize risk modeling and RSEs to conduct alternatives analysis and guide the selection of optimal solutions. WiNGS is still under development with pilots that are helping SDG&E evaluate capital hardening alternatives at a segment level as follows:

- Evaluating the segment's current risk level;
- Estimating potential risk reductions from implementing different hardening solutions;
- Evaluating costs based on miles that would need to be mitigated; and
- Conducting an RSE analysis to guide investment decisions for distribution segments in the HFTD.

WiNGS applies the CPUC's Safety Model Assessment Proceeding (S-MAP) approved framework with enhanced analytics at the segment level. As the model evolves, it will continue to be updated to incorporate better data, integrate other risk models such as the ones mentioned above for pole loading, and expand its scope of application to look at other initiatives beyond capital hardening projects.

In response to this Guidance-2 condition, SDG&E provides additional details for each of its grid hardening and vegetation management initiatives.

Grid Hardening Initiatives

SDG&E's grid hardening initiatives can be categorized into three buckets: System Hardening, Backup Power, and Equipment Replacements and Installations. Alternatives considered for each grid hardening initiative are outlined below in these three buckets.

System Hardening

System Hardening includes the following list of initiatives in SDG&E's 2020 WMP:

- Pole Replacement and Reinforcement
- Overhead Fire Hardening
- Covered Conductor Installation
- Undergrounding of Electric Lines and/or Equipment

Pole Replacement and Reinforcement is an initiative that is strictly driven by inspection findings and includes necessary work to adhere to regulatory compliance guidelines.[7] As such, no alternatives are considered for that initiative.

Overhead Fire Hardening, Covered Conductor Installation, and Undergrounding are considered alternatives to one other, and the determination of the amount or location of these hardening efforts depends on many factors including risk, cost and feasibility of implementation. As described in SDG&E's 2019 RAMP report in the Wildfire risk chapter, although undergrounding the entire HFTD was not formally considered by SDG&E as an alternative, it has been previously discussed but dismissed due to the very high cost and difficulty of implementation. Instead, SDG&E considered limiting the scope of undergrounding to target the highest risk areas where feasible and alternatively consider other means of system hardening such as continuing wood-to-steel pole replacements or installation of covered conductor in other areas to mitigate the fire risk.

In general, when evaluating alternatives, SDG&E uses tools such as Power Line Systems – Computer Aided Design and Drafting (PLS-CADD)/BSE Cost Estimator, meteorology tools as well as vegetation mapping capabilities to inform selection of alternatives. As far as using RSE methodologies to inform alternatives analysis, however, SDG&E is still in the early stages of implementing RSE-type modeling to assess all alternatives for all initiatives. Although SDG&E did not have an advanced tool to quantify RSE for all alternatives at the time of its 2020 WMP filing, it has made significant strides in the development of a new model (WiNGS) to aid with those assessments to enhance its decision-making process. As previously mentioned, WiNGS is still in the early stages of development, but a pilot implementation of the model allows SDG&E to evaluate circuits and determine the optimal mix of system hardening solutions including whether or not a portion of a circuit needs a hardening solution.

The summary table below provides the information required by this condition:

[7] CPUC General Order (GO) 95 and GO 165.

Gudiance-2 Table 5
System Hardening Summary Table

Initiative	Alternatives	Tools/Models	Risk Reduction Quantification Method	Reason for Selection
Pole Replacement and Reinforcement	N/A (Compliance)			
Overhead Fire Hardening	• No Mitigation • Covered Conductor • Underground	• Currently working on new model • Example of tools used include WRRM and PRiME model, PLS-CADD/BSE Cost Estimator/ Meteorology and Vegetation mapping/ Legacy strategic planning initiatives	• Subject Matter Expertise backed by some historical data analysis • Overhead hardening efforts have proven effective from prior year efforts • Cost/mile value modeling proved more scalable with overhead design	• More optimal solution for mitigating risk • Overhead design was the most scalable and economical option to reduce HFTD risk
Covered Conductor Installation	• No Mitigation • Overhead Fire Hardening • Underground	• Currently working on new model	• Subject Matter Expertise backed by some historical data analysis	• More optimal solution for mitigating risk including flying debris
Undergrounding of Electric Lines and/or Equipment	• No Mitigation • Overhead Fire Hardening • Covered conductor	• Currently working on new model • PSPS Historical data/Meteorology and Vegetation mapping/Current Estimates from EDP, District, New Business/WOR Cost Estimator	• Subject Matter Expertise backed by some historical data analysis. • Since SDGE began tracking CPUC reportable ignitions it has not had an ignition associated with its 61% UG system	• More effective solution for mitigating significant amount of risk in critical areas

Backup Power

Backup power includes the following list of initiatives in SDG&E's 2020 WMP:

- Microgrids
- Customer Resiliency Programs
- Generator Grant Program Expansion
- Whole Home Generators

SDG&E implements PSPS as a last resort to manage the ever-increasing risk of wildfires during fire season. Recognizing the impacts that PSPS causes to many of SDG&E's customers and communities, SDG&E considers various ways to mitigate the impacts of PSPS to customers including different backup power solutions. These solutions include identification of communities where microgrids may be needed and are feasible to implement, as well as various generator options to offer to customers who are affected by PSPS. Similar to the system hardening initiatives, these backup power initiatives can be thought of as alternatives to each other, and the implementation of them depends on understanding areas most prone to high winds and thus most affected by PSPS, types of customers in those areas and the various needs of the communities that SDG&E serves.

For microgrids, SDG&E considers different locations for installation of microgrids depending on various factors including system hardening efforts, feasibility of installing microgrid solutions as well as the needs of the communities that the microgrids would serve. Upon identification of circuits impacted by PSPS, SDG&E incorporated the following criteria when implementing a microgrid as a mitigation solution: 1) is the circuit in construction for undergrounding solutions; 2) is an undergrounding solution feasible from a geographical, environmental, or cultural perspective; 3) what is the timeline of engineering, designing, and constructing the underground solution; 4) location of nearest sectionalizing device; and 5) proximity of customers to the nearest substation and the cost associated with converting those overhead assets to underground. Alternatives considered for this initiative include location, number of microgrids, as well as type of microgrid, which all depend on the factors described above.

For generator solutions, SDG&E considers the specific needs of its customers and how it can best prepare them for fire season. Alternatives considered for the generator options include location, number of generators as well as type of generator depending on the same factors outlined above.

The summary table below provides the information required by this condition:

Guidance-2 Table 6
Backup Power Summary Table

Initiative	Alternatives	Tools/Models	Risk Reduction Quantification Method	Reason for Selection
Microgrids	Different locations and types of microgrids (renewable vs fossil fuel)	Currently working on new model.	Subject Matter Expertise supported by historical data analysis	More optimal solution for mitigating PSPS impacts
Customer Resiliency Programs	Different types of generators	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating PSPS impacts
Generator Grant Program Expansion	No expansion to the Generator Grant Program	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating PSPS impacts
Whole Home Generators	Maintain status quo (no whole home solutions) Different types of generators	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating PSPS impacts

Equipment Replacements and Installations

Equipment replacements and installations includes the following list of initiatives in SDG&E's 2020 WMP:

- SCADA Capacitor Program
- Advanced Protection
- Expulsion Fuse Replacement Program
- Hotline Clamp Replacement Program
- Lightning Arrestor Replacement Program
- LTE Communication Network
- Sectionalizing Devices

Regarding alternatives analysis on equipment, SDG&E targets equipment that has been identified to have a higher risk relative to other types of equipment. As such, a general alternative to the proposed equipment initiatives is to address other equipment on the system or maintain the status quo (*e.g.*, do not replace lightning arrestors). These alternatives are not as beneficial in reducing the risk, which is why SDG&E proposed the initiatives listed above.

Sectionalizing devices allow SDG&E to isolate its system better to limit the impacts of outages to customers including those driven by PSPS implementation. An alternative to that initiative would have been to not consider additional sectionalizing capability, but that would not have helped reduce the PSPS impacts, which is a key objective for SDG&E. Finally, the LTE Communication Network as described in SDG&E's 2020 WMP is foundational to the enhancements proposed in Advanced Protection. As such, not implementing the LTE Communication Network would not have provided the benefit that Advanced Protection offers from a fire prevention standpoint.

The summary table below provides the information required by this condition:

Guidance 2 Table 7
Equipment Replacements and Installations Summary Table

Initiative	Alternatives	Tools/Models	Risk Reduction Quantification Method	Reason for Selection
SCADA Capacitor Program	Maintain status quo	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating risk
Advanced Protection	Maintain status quo	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating risk
Expulsion Fuse Replacement Program	Maintain status quo	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating risk
Hotline Clamp Replacement Program	Maintain status quo	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating risk
Lightning Arrestor Replacement Program	Maintain status quo	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating risk
LTE Communication Network	Maintain status quo	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating risk
Sectionalizing Devices	Maintain status quo	Currently working on new model.	Subject Matter Expertise backed by some historical data analysis	More optimal solution for mitigating risk

Vegetation Management Initiatives

Vegetation management includes the following list of initiatives in SDG&E's 2020 WMP:

- Tree Trimming
- Enhanced Inspections Patrols and Trimming
- Pole Brushing
- Fuels Management

SDG&E's vegetation management program has been in place for many years. Alternatives considered for vegetation management include obtaining different clearances where possible or using different technologies to aid with inspections among other options.

The summary table below provides the information required by this condition:

Guidance-2 Table 8
Vegetation Management Summary Table

Initiative	Alternatives	Tools/Models	Risk Reduction Quantification Method	Reason for Selection
Tree Trimming	Undergrounding or relocation of lines; Obtaining clearances that are less than 25 feet but are still greater than required or recommended by regulator, where lesser clearances can still mitigate the risk when appropriately considering site specific and tree-specific considerations	Currently working on new model	Subject Matter Expertise backed by some historical data analysis	More expensive to underground or relocate lines; Clearance has to match site-specific conditions so cannot always avoid the 25 ft. clearance
Enhanced Inspections Patrols and Trimming	Using LiDAR / Satellite inspections	Currently working on new model	Subject Matter Expertise backed by some historical data analysis	Turnaround timeframe is too long, and technologies are costly
Pole Brushing	Replacing equipment where possible to prevent need for required pole brushing	Currently working on new model	Subject Matter Expertise backed by some historical data analysis	Operational constraints may prevent us from being able to replace equipment

Initiative	Alternatives	Tools/Models	Risk Reduction Quantification Method	Reason for Selection
Fuels Management	Working closely with fire agencies and other stakeholder to consider multiple possible projects and partnerships	Fire Coordination SME and fire behavior modeling software leveraged to prioritize projects	SME analysis of fire behavior modeling output	SME determined the greatest benefit to the community

C. Condition Guidance-4: Lack of Discussion on PSPS Impacts

In its first quarterly report, each electrical corporation shall detail whether and how each initiative in its WMP:

i. affects its threshold values for initiating PSPS events;
ii. is expected to reduce the frequency (i.e. number of events) of PSPS events;
iii. is expected to reduce the scope (i.e. number of customers impacted) of PSPS events;
iv. is expected to reduce the duration of PSPS events; and
v. supports its directional vision for necessity of PSPS, as outlined in Section 4.4 of its WMP.

Since 2013, SDG&E has used PSPS as a measure of last resort to protect public safety and prevent catastrophic wildfires. In an effort to continually improve its operations, SDG&E continues to develop approaches to reduce the impact (both scope and duration) of PSPS events. PSPS is a complicated process because it depends on a variety of dynamic inputs such as winds, humidity, fuel moisture, drought and climate changes, which are outside of SDG&E's control. SDG&E strives to advance its suite of tools to further enhance its PSPS decision making. The Company is actively engaged with stakeholders, customers, and community partners to discuss PSPS preparation plans. SDG&E seeks to expand its current PSPS public education initiatives and add new initiatives based on feedback from all key stakeholders.

Many of SDG&E's initiatives play a role in reducing PSPS, some more directly than others. For example, hardening initiatives such as implementation of covered conductor and undergrounding have direct impacts on reducing PSPS because they reduce the wildfire risk, thereby reducing either the need for PSPS or the scope and duration of PSPS events depending on where they are implemented. Other initiatives such as inspections – though not directly related to mitigating PSPS – ensure that the health of SDG&E's assets is maintained and improved over time, which affects decisions to PSPS.

To best respond to the conditions in this guidance, SDG&E breaks-out its initiatives based on three categorizations:

1. They offer direct PSPS mitigation (Direct PSPS Mitigation);
2. They are foundational supporting mitigations (Foundational for PSPS Mitigation); or
3. Their primary purpose is not tied to PSPS mitigation (Not PSPS Mitigation).

While many of these initiatives could reduce the frequency, scope or duration of PSPS, some are aimed at reducing the impacts, which is an additional benefit not specifically listed in the items in this condition. An example of that is deployment of microgrids or generators; from a customer perspective, microgrids would reduce not only the duration of the PSPS event but also the number of events experienced. From a system operation perspective, however, the duration of a PSPS is impacted by location of the transmission line and weather factors in the area of the transmission line. Such mitigations do not stop a PSPS from occurring on a system level, but they provide continuity of power so that customers do not experience an outage.

In response to the conditions outline in this deficiency and to provide additional information, SDG&E prepared the following table to identify which initiatives affect PSPS and how they affect PSPS (according to the five conditions outlined in this guidance).

Guidance-4 Table 9
Direct PSPS Mitigation

ID	Program/Initiative	Affects Threshold	Reduces Frequency	Reduces Scope	Reduces Duration	Supports Directional Vision	Explanations
C.2	Circuit breaker maintenance and installation to de-energize lines upon detecting a fault		X	X	X		Advanced protection could allow SDG&E to keep lines energized because of the added capability of technologies such as falling conductor
C.17.1	Updates to grid topology to minimize risk of ignition in HFTDs (Distribution OH Hardening)	X	X	X		X	While not entirely eliminating PSPS events because of exposure to other overhead equipment and unforeseen wind speeds, the effects on PSPS require that entire segments be hardened.
C.3	Covered conductor installation	X	X	X		X	While not entirely eliminating PSPS events because of exposure to other overhead equipment, covered conductor installed in key locations will dramatically reduce ignitions caused by wire to wire slap, foreign object contact and during wire down events.
C.8.1	Grid topology improvements to mitigate or reduce PSPS events (sectionalizing devices)		X	X	X		Sectionalizing devices allow SDG&E to target PSPS operation, which reduces the scope of customers impacted

ID	Program/Initiative	Affects Threshold	Reduces Frequency	Reduces Scope	Reduces Duration	Supports Directional Vision	Explanations
C.8.2	Grid topology improvements to mitigate or reduce PSPS events (Microgrids)			X	X	X	Microgrids are designed to meet the needs of the communities by providing resiliency services which result in a reduction of the severity of impacts of PSPS or eliminating the impact felt by customers of PSPS altogether. The resiliency benefits are not only provided to the customers served by the microgrid, but also to customers who may rely on the services of the facilities that are able to be available during a PSPS event. Microgrids can create a "resilient oasis" allowing critical facilities such as hospitals, grocery stores, police and fire stations, food establishments and others to serve their communities. From a system operation perspective, the duration of a PSPS is impacted by location of the transmission line and weather factors in the area of the transmission line

ID	Program/Initiative	Affects Threshold	Reduces Frequency	Reduces Scope	Reduces Duration	Supports Directional Vision	Explanations
C.11.2	Mitigation of impact on customers and other residents affected during PSPS event (customer resiliency programs)			X		X	From a customer perspective, generators would reduce not only the duration of the PSPS event but also the number of events experienced. From a system operation perspective, the duration of a PSPS is impacted by location of the transmission line and weather factors in the area of the transmission line.
C.11.3	Mitigation of impact on customers and other residents affected during PSPS event (Generator Grant Program)			X		X	From a customer perspective, generators would reduce not only the duration of the PSPS event but also the number of events experienced. From a system operation perspective, the duration of a PSPS is impacted by location of the transmission line and weather factors in the area of the transmission line.
C.11.1	Mitigation of impact on customers and other residents affected during PSPS event (Whole Home Generator Program)			X	X	X	From a customer perspective, generators would reduce not only the duration of the PSPS event but also the number of events experienced. From a system operation perspective, the duration of a PSPS is impacted by location of the transmission line and weather factors in the area of the transmission line.

ID	Program/Initiative	Affects Threshold	Reduces Frequency	Reduces Scope	Reduces Duration	Supports Directional Vision	Explanations
C.16	Undergrounding of electric lines and/or equipment	X	X	X	X	X	Undergrounding reduces or eliminates PSPS. Buried lines and cables are not impacted by high winds and other adverse weather conditions, vegetation risk, debris contacts, and less maintenance and operational risk to human and animal contact due to its buried and hidden nature.
C.17.1	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH Hardening)	X	X	X		X	2020 efforts did complete a goal of having a hardened segment into all substations within HFTD Tier 3. Extreme weather events with flying debris could lead to PSPS events for hardened lines, but duration would be reduced.
C.17.3	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission UG Hardening)	X	X	X	X	X	Used in site-specific cases
C.17.4	Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH distribution underbuilt)	X	X	X		X	Hardened transmission underbuild lines are designed for known local wind events. Extreme weather events with flying debris could lead to PSPS events for hardened lines, but duration would be reduced. Only affects PSPS if segments are 100% hardened.
C.17.5	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Transmission OH)	X	X	X		X	2020 efforts did complete a goal of having a hardened segment into all substations within HFTD Tier 3. Extreme weather events with flying debris could lead to PSPS events for hardened lines, but duration would be reduced

ID	Program/Initiative	Affects Threshold	Reduces Frequency	Reduces Scope	Reduces Duration	Supports Directional Vision	Explanations
C.17.6	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution underbuilt on Transmission OH)	X	X	X		X	Hardened transmission underbuilt lines are designed for known local wind events. Extreme weather events with flying debris could lead to PSPS events for hardened lines, but duration would be reduced. Only affects PSPS if segments are 100% hardened
C.17.7	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution OH)	X	X	X		X	While not entirely eliminating PSPS events because of exposure to other overhead equipment and unforeseen wind speeds, the effects on PSPS require that entire segments be hardened
C.17.8	Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution UG)	X	X	X	X	X	Used in site-specific cases
C.18.2	Other (LTE Communication Network)	X	X	X			LTE network is necessary for implementing advanced protection that could allow SDG&E to keep lines energized because of the added capability of technologies such as falling conductor
F.1	Automatic recloser operations	X	X	X			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
F.6.1	Stationed and on-call ignition prevention and suppression resources and services (Aviation Firefighting Program)				X		Aviation Services Division (ASD) Program supports CAL FIRE with Firefighting assets ensuring there are capable aerial firefighting assets available to San Diego and southern Orange Counties. Other ASD Helicopters are used for patrols and inspections pre-event and during restoration efforts post PSPS events if they are not utilized to fight fires.

ID	Program/Initiative	Affects Threshold	Reduces Frequency	Reduces Scope	Reduces Duration	Supports Directional Vision	Explanations
I.1	Adequate and trained workforce for service restoration (EOC)				X		A well-established emergency response plan and well trained and certified workforce can expedite restoration

Guidance-4 Table 10
Foundational for PSPS Mitigation

Line Item	Program/Initiative	Explanations
A.1	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	All of these initiatives are focused on enhancing SDG&E's situational awareness and risk assessment capabilities. While they do not directly mitigate PSPS, they are foundational to supporting SDG&E's PSPS decision-making. The increased understanding of the risk via WRRM helps SDG&E focus only on the very high-risk events. High performance computing infrastructure provides a means of obtaining high-resolution weather forecast data that informs both scope and duration of PSPS events. Historical weather station data informs thresholds identifying when winds have surpassed what is typical for that region. Monitoring of the weather station data in real-time provides indication of whether those thresholds have or have not been met. Wildfire risk indices allow for the identification of when and where the fire threat is greatest, and can be used to narrow down the scope of Red Flag Warning events.
B.1	Advanced weather monitoring and weather stations	
B.4	Forecast of fire risk index, fire potential index, or similar	
G.1	Centralized repository for data	
H.1.3	Allocation methodology development and application (PSPS Mitigation Engineering Team)	This team was established to specifically focus on finding ways to mitigate PSPS impacts to customers. While the team itself does not directly mitigate PSPS, the solutions the team proposed and analyzed such as hardening initiatives and additional sectionalizing directly reduce PSPS.

Guidance-4 Table 11
Not PSPS Mitigation

ID	Program/Initiative	Explanations
B.3	Fault indicators for detecting faults on electric lines and equipment	Primarily a wildfire mitigation - allows for faster identification of faults on the distribution system.
C.1	Capacitor maintenance and replacement program	While not solely replacement will reduce PSPS, a combination of this equipment and additional fire hardening installation will reduce.
C.6	Distribution pole replacement and reinforcement, including with composite poles	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
D.6	Intrusive pole inspections	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
C.7	Expulsion fuse replacement	While not solely replacement will reduce PSPS, a combination of this equipment and additional fire hardening installation could reduce PSPS
C.10	Maintenance, repair, and replacement of connectors, including hotline clamps	While not solely replacement will reduce PSPS, a combination of this equipment and additional fire hardening installation could reduce PSPS
C.18.1	Other (Lightning Arrestor Replacement Program)	While not solely replacement will reduce PSPS, a combination of this equipment and additional fire hardening installation could reduce PSPS
D.1	Detailed inspections of distribution electric lines and equipment	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
D.2	Detailed inspections of transmission electric lines and equipment	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
D.4	Infrared inspections of distribution electric lines and equipment	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
D.9.1	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (HFTD Tier 3 Inspections)	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.

ID	Program/Initiative	Explanations
D.9.2	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone flights and assessments)	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
D.9.4	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone Repairs)	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
D.9.3	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Circuit Ownership)	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
D.11	Patrol inspections of distribution electric lines and equipment	Replacing aging and damaged structures reduces risk, but it does so at an asset by asset level. Because SDG&E executes PSPS at the segment level, this typically will not impact PSPS.
D.15	Substation inspections	Substations are not deenergized due to substation risk. They may be impacted by PSPS due to transmission risk. Inspections can help reduce failures but do not affect PSPS.
E.2	Detailed inspections of vegetation around distribution electric lines and equipment	SDG&E uses VRI and tree strike to determine when to PSPS but performance of tree trimming while important, does not affect decisions of PSPS in the moment. Although it helps reduce the fire risk, it may not have a significant enough impact on VRI polygons due to the density of trees in those polygons.
E.5	Fuel management and reduction of “slash” from vegetation management activities	Relatively new program. SDG&E will continue to monitor it to see if it could have applications that could affect PSPS.
E.9	Other discretionary inspections of vegetation around distribution electric lines and equipment	SDG&E uses VRI and tree strike to determine when to PSPS but performance of enhanced inspections patrols and trimming while important, does not affect decisions of PSPS at the moment. Although it helps reduce the fire risk, it may not have a significant enough impact on VRI polygons due to the density of trees in those polygons. However, SDG&E will continue to monitor effects of enhanced clearances to see how they can affect PSPS.

ID	Program/Initiative	Explanations
E.20	Vegetation management to achieve clearances around electric lines and equipment (Pole Brushing)	While not necessarily eliminating PSPS events, removing or modifying ground vegetation within expanded areas adjacent to energized facilities will reduce ignitions associated with wire down events.
F.2	Crew-accompanying ignition prevention and suppression resources and services	Primary role is to manage consequences of wildfires if they start
F.3	Personnel work procedures and training in conditions of elevated fire risk	Primary role is to mitigate potential wildfires
F.6.2	PSPS events and mitigation of PSPS impacts (Communication practices)	Communication Practices and Community Engagement are used to inform impacted customers before, during and after PSPS events. It is also used to help educate them about PSPS events and how to be resilient.
F.5.1	Stationed and on-call ignition prevention and suppression resources and services (Industrial Fire Brigade)	Primary role is to manage consequences of wildfires if they start
G.4	Tracking and analysis of near miss data	Primary role is monitoring and tracking of incidents to mitigate wildfires
H.1.1	Allocation methodology development and application	Primary role is to establish leading asset management practices to better inform decision-making
H.1.2	Allocation methodology development and application - (Wildfire Mitigation Personnel)	The wildfire mitigation team supports various activities across the company and is not necessarily directly linked to PSPS mitigation though the team may support PSPS reduction initiatives

D. Condition Guidance-5: Aggregation of Initiatives into Programs

In its first quarterly report, each electrical corporation shall:

i. *break out its programs outlined in section 5.3 into individual initiatives;*
ii. *report its spend on each individual initiative;*
iii. *describe the effectiveness of each initiative at reducing ignition probability or wildfire consequence;*
iv. *list all data and metrics used to evaluate effectiveness described in (iii), including the threshold values used to differentiate between effective and ineffective initiatives; and*
v. *provide the information required for each initiative in section 5.3 of the Guidelines.*

Please see Appendix A where, to the extent feasible, SDG&E breaks out its 2020 WMP Section 5.3 programs into individual initiatives, and provides the information called for in this condition.

In SDG&E's 2019 RAMP and 2020 WMP submittal, SDG&E generally used ignition data and subject matter expertise to estimate the effectiveness of its mitigations. Going forward, SDG&E is developing ways to use all available data to measure the effectiveness of each of its mitigation programs. For mitigations that have been in place for several years, these studies are in progress. For new mitigations, these studies will be conducted going forward as SDG&E begins to collect the data. This process is described at each initiative level in Appendix A.

E. Condition Guidance-6: Failure to Disaggregate WMP Initiatives from Standard Operations

In its first quarterly report, each electrical corporation shall:

i. *clearly identify each initiative in Section 5.3 of its WMP as "Standard Operations" or "Augmented Wildfire Operations;"*
ii. *report WMP required data for all Standard Operations and Augmented Wildfire Operations;*
iii. *confirm that it is budgeting and accounting for WMP activity of each initiative; and*
iv. *include a "ledger" of all subaccounts that show a breakdown by initiative.*

In Appendix B, SDG&E identifies all programs in Section 5.3 of its 2020 WMP as either standard operations or augmented wildfire operations. Regarding how SDG&E tracks costs for capital programs, costs are tracked at the program level through a budget code (number). Multiple work orders can be created for individual projects, however, each work order is associated with a budget code so that SDG&E can track capital program costs at a summary level. This is illustrated in SDG&E's general rate case (GRC) under electric distribution capital, where programs are presented using budget codes as part of the description.[8]

For O&M work, SDG&E typically summarizes costs at a work group level under accounts referred to as cost centers, which represent all charges made at an organizational structure level. For example, electric distribution engineering has a cost center, and all work that department perform is charged to that cost center, so that there is a history of labor and non-labor that associated with the collective activities performed by that group. Those activities are then described in the GRC under that work group.

For work groups with functions that are 100% dedicated to wildfire mitigation, these costs are easily tracked. An example would be vegetation management, where 100% of labor and non-labor from that cost center are tracked as wildfire mitigation activities. Some reporting challenges with this method are that specific or enhanced programs are all charged the same way. For enhanced vegetation management, which involves some additional trimming of at risk species within the HFTD, those trim jobs are completed by going through the normal work order and charging process that sums up each job at the vegetation work group cost. To determine how much of the entire vegetation management year to date (YTD) spend was associated with enhanced vegetation management requires estimations based off reasonable assumptions, due to trim jobs being tracked as a whole since there is no separate cost center for that activity and it is all charged to vegetation management in general.

Because of RAMP and the WMP and the need to track O&M costs at a more granular activity level, SDG&E has developed an O&M equivalent of the capital budget code referred to as internal order numbers. For O&M specific project activities, this is a useful tool to track costs at

[8] *See* https://www.sdge.com/sites/default/files/regulatory/SDG%2526E-14-R_Colton_Revised_Prepared_Direct_Testimony.pdf

a granular level. This does not easily apply to every activity as it takes significant effort to train employees to charge the activity if they are asked to perform different activities at different times of the day. The internal order number approach works best when employees are dedicated to this activity. SDG&E is using this tool to help break out distribution inspection costs in future years to better align with WMP requirements. A detailed breakdown is provided in Appendix B.

F. Condition Guidance-7: Lack of Detail on Effectiveness of "Enhanced" Inspection Programs

In its first quarterly report, each electrical corporation shall detail:

i. *the incremental quantifiable risk identified by such 'enhanced' inspection programs;*
ii. *whether it addresses the findings uncovered by 'enhanced' programs differently than findings discovered through existing inspections; and*
iii. *a detailed cost-benefit analysis of combining elements of such 'enhanced' inspections into existing inspection programs.*

Incremental Quantifiable Risk of Enhanced Inspection Programs

As discussed in Guidance-6 above, the effectiveness of inspections cannot be directly measured through a reactive lens because inspections are proactive programs. Inspections identify issues that could lead to failures and repair them before the failures occur. Thus, the avoided failures cannot be identified. Nevertheless, in SDG&E's maintenance history, there have been instances where issues identified for repair failed before the repairs were made. Lessons learned from such instances led to the priority system SDG&E uses today. SDG&E calculates an estimated effectiveness by filtering the issues identified to those that could lead to faults and ignitions, after which SDG&E categorizes those conditions into emergency, priority, and non-critical. These categories are associated with different repair time frames. Emergency orders must be repaired in 0-3 days, priority within 30 days, and non-critical within one year.

Using this information, SDG&E developed an estimated fault rate associated with the criticality. All emergencies were expected to cause a fault 25% of the time if not addressed within the next inspection cycle. Given 3 days for emergency and 30 days for priority, SDG&E divided the failure rate by 10 for priority, assuming 2.5% would lead to faults if not repaired before the next cycle. And finally, for non-critical going from 1 month to 12 months, SDG&E divided the 2.5% by 12 to get an assumption of 0.21% of non-critical issues would lead to faults if not addressed before the next inspection cycle. SDG&E then calculated ignition avoided by multiplying faults avoided by the overall 5-year average fault to ignition percent, which was calculated to be 2.08% for distribution from SDG&E's 2020 WMP Table 11.

SDG&E considers the following inspection programs as "enhanced" over what is currently mandated by GO 165:

1. Additional HFTD Tier 3 inspections
2. Distribution infrared pilot program
3. Distribution drone assessment program

The additional HFTD Tier 3 inspections formerly known as the QA/QC program was established in 2016, and as such SDG&E is able to provide historical findings data for this program. Since the remaining two programs are pilots for 2020, SDG&E only has the data found to date from

the initial inspections. Tables summarizing the risk reduction results for each program are provided below.

Guidance-7 Table 12
Additional HFTD Tier 3 Inspections

Based on the findings from these inspections and the assumptions above, SDG&E estimates that if these inspections were not performed, SDG&E would experience another 23 electrical faults and 0.48 ignitions annually.

Year	Inspection Count	Fire Safety Infractions
2016	10,511	614
2017	15,952	468
2018	14,234	373
2019	12,502	411
2020	11,864	456
5 yr avg	**13012.6**	**464.4**

QA/QC Tier 3 Findings

Year	Priority	Count
2016	Emergency (0-3 days)	2
	Priority (4-30 days)	72
	Non-critical	540
2017	Emergency (0-3 days)	19
	Priority (4-30 days)	64
	Non-critical	385
2018	Emergency (0-3 days)	60
	Priority (4-30 days)	102
	Non-critical	211
2019	Emergency (0-3 days)	2
	Priority (4-30 days)	41
	Non-critical	368
2020	Emergency (0-3 days)	5
	Priority (4-30 days)	143
	Non-critical	308
5 yr avg	**Emergency (0-3 days)**	**18**
	Priority (4-30 days)	**84**
	Non-critical (6-12 mos)	**362**

Annual QA/QC faults avoided	7
Annual QA/QC ignitions avoided	0.151
cycle	*3*

Guidance-7 Table 13
Distribution Infrared Inspections

The assumptions are changed for the distribution infrared inspections. Because these inspections are looking at hot connections or other hot anomalies that could not be detected by a visual inspection, it is assumed that every issue found would lead to a fault. After over 4,500 inspections, however, SDG&E has only identified one hot connection and therefore assumes one fault reduced, and 0.02 ignitions reduced in 2021. As discussed in Section II.G: Guidance-9 below, SDG&E would like the time to complete the pilot as this is still a relatively small sample before completing its final evaluation of whether or not it will continue to pursue this program in the future.

Year	Inspection Count	Priority	Count
2020 (Pilot)	4621	Emergency (0-3 days)	-
		Priority (4-30 days)	1
		Non-critical	-
	Issue Rate		0.00022
	Dist IR faults avoided		1
	Dist IR ignitions avoided		0.021
	cycle		5

Guidance-7 Table 14
Drone Assessments

Based on the findings from these inspections and the assumptions above, SDG&E estimates that that this program will lead to one-time annual incremental benefit of 18 reduced faults in the HFTD and an associated 0.38 reduced ignitions. If the program is sustained on a three-year cycle, SDG&E would expect to continue receiving those benefits on an annual basis.

Year	Inspection Count	Priority	Count
2020 (Pilot in Tier 3)	30365	Emergency	61
		Priority	1154
		Non - critical	4858
	Issue Rate		0.2

Drone faults avoided	18
Drone ignitions avoided	.376
proposed cycle	*3-5*

How Findings from Enhanced and Existing Inspection Programs are Addressed

As described in SDG&E's approach for risk quantification (in Guidance-5), the issues found on the enhanced inspection programs are prioritized and resolved in the same manner as all the existing inspection and repair programs.

Cost-Benefit Analysis of Combining Elements of Enhanced and Existing Inspection Programs

SDG&E is not sure how these specific programs could be combined with other inspection programs and still retain the value and risk reduction they were meant to have. The value of the HFTD Tier 3 inspection program is the increased frequency of inspections it provides in the highest risk areas of the service territory. SDG&E performs this inspection on the HFTD Tier 3 overhead assets on a three-year cycle. This approach, combined with SDG&E's detailed inspections, which occur once every five years, means that the HFTD Tier 3 assets receive a detailed inspection on average a little more than every two years (1.88). If SDG&E were to combine this program with its five-year inspections, the frequency of inspection would go down, and SDG&E would expect an increase in the number of faults and ignitions. In addition, if the five-year inspection cycle and three-year inspection cycle align to fall on the same year, SDG&E would identify these structures at the beginning of the year and only complete one inspection for those structures that year.

With the technology inspections (infrared and drone), combining them is not feasible at this time. To perform an infrared inspection, high zoom infrared cameras are mounted on vehicles to obtain a usable thermal image. An inspector carrying an infrared gun or handheld camera could not accomplish the same inspection.

Compared to an infrared inspection, the drone program utilizes a completely different approach. The first part of the process involves drone pilots flying over distribution assets, taking pictures according to a standardized shot sheet, and then the photos get uploaded to a shared site where qualified electrical workers perform an assessment of the imagery from the office.

While the infrared and drone programs cannot be combined at this time, SDG&E is open to the potential of combining them in the future as the technology improves.

G. Condition Guidance-9: Insufficient Discussion of Pilot Programs

In its quarterly report, each electrical corporation shall detail:

i. *all pilot programs or demonstrations identified in its WMP;*
ii. *status of the pilot, including where pilots have been initiated and whether the pilot is progressing toward broader adoption;*
iii. *results of the pilot, including quantitative performance metrics and quantitative risk reduction benefits;*
iv. *how the electrical corporation remedies ignitions or faults revealed during the pilot on a schedule that promptly mitigates the risk of such ignition or fault, and incorporates such mitigation into its operational practices; and*
v. *a proposal for how to expand use of the technology if it reduces ignition risk materially.*

In its 2020 WMP, SDG&E identified 11 pilot programs/demonstrations. They are: Covered Conductor, Distribution Infrared Inspections, Expanded Generator Grant Program, Advanced Protection – Falling Conductor Protection, Strategic Undergrounding, Drone Assessment, Circuit Ownership, Vegetation Management LiDAR, Ignition Management, Fuels Management, and Vehicle Tracking. SDG&E provides the following information for each pilot as required by this condition.

Covered Conductor (WMP Section 5.3.3.3)

Status of Pilot: In 2020, SDG&E is piloting a new three layered covered conductor. SDG&E received the equipment associated with the pilot and has already completed a demonstration of the stringing practice for the new equipment (see Figure 2 below). The demonstration took place in a controlled environment to improve work methods and practices, as well as to ensure crews are safely installing the new equipment. SDG&E is developing a road show for construction crews and is on track to start construction in the fourth quarter of 2020. Other locations within the HFTD are planned for a 2021 installation and are currently in the design phase. Future adoption of this product is progressing well and is on schedule.

Guidance-9 Figure 2
Stringing Covered Conductor

Results of Pilot: SDG&E plans to gauge the success of the pilot in several ways including assessments of: safely constructing the equipment, post-construction quality assurance checks, evaluation of equipment after extreme weather has been applied to the product in its final state, and ignitions tied to the new equipment. SDG&E expects the locations where the covered conductor is installed will reduce any bare wire-related ignitions (*e.g.*, wire to wire slap, foreign objects). SDG&E plans to measure effectiveness of this mitigation by comparing the reliability performance of the distribution lines before covered conductor was installed to the reliability performance after covered conductor was installed normalized by operating years for an apples to apples comparison. SDG&E plans to have a dedicated team monitor outages that are reported into the system dealing with the covered conductor. This dedicated team will be required to present covered conductor performance results during SDG&E's Electric Risk Analysis team meetings. The performance results should to identify the root cause of any outages associated with the covered conductor, identify mitigation techniques, and identify required improvements within SDG&E's Construction Standards.

Remedy of Ignitions/Faults Revealed During Pilot: N/A

Expanded Use of Technology: If this pilot is successful, SDG&E will consider expanding the use and installation of covered conductor in key locations to minimize ignitions. In addition, SDG&E would pursue installing this product in other areas prone to wire downs or in close proximity to large public gatherings.

Distribution Infrared Inspections (WMP Section 5.3.4.4)
Status of Pilot: At the beginning of the second quarter of 2020, SDG&E began piloting its new distribution infrared inspection program. This program uses the same infrared technology currently used for transmission and substation inspections with the intent to identify thermal hotspots in equipment and connections to detect potential issues that cannot be seen through traditional visual inspections. As of the end of July 2020, approximately 6,000 distribution structures have been inspected with this technology within Tier 3 of the HFTD. This represents about 7.5% of the distribution structures within the HFTD. At the current inspection rate and with recent efficiencies achieved, SDG&E is currently ramping up inspections through this pilot program to meet the planned inspection rate of 20% of HFTD distribution structures per year starting in 2021.

Results of Pilot: SDG&E is still in the early stage of implementation of the infrared program on the distribution system. Issues identified through the infrared program are often issues that would not have been identified through current visual or detailed inspections. SDG&E plans to track the infrared inspection findings to evaluate the risk reduction potential.

Remedy of Ignitions/Faults Revealed During Pilot: The current thermography team consists of previous linemen and electricians who evaluate the thermal results and the structures. With their knowledge of the electrical system, thermography, and the results, they can appropriately assess the potential risk for more accurate prioritization. The thermography team provides a report of their findings and prioritization to the distribution compliance team to include with their maintenance prioritization. In cases where larger potential concerns exist, a phone call directly to the responsible district will be made to provide an immediate assessment and repair where deemed necessary. This process ensures identified risks are appropriately prioritized. In areas where issues occur and further evaluation is required, the program has been reviewing the areas of concern to ensure no further issues exist.

Expanded Use of Technology: If the program proves successful, the timeline and resources being allocated would be further evaluated to find the optimal inspection cycle and if specific locations require an alternate cycle.

Expanded Generator Grant Program (WMP Section 5.3.3.11.2)
Status of Pilot: This program was completed last year. SDG&E offered 80 units to medical baseline customers and 65 customers opted into SDG&E's generator grant program, that provides a small portable battery with solar charging panel to power their life support equipment.

Results of Pilot: SDG&E measured the effectiveness of this program through customer surveys. Survey results were very positive. Here is a summary of the pilot program metrics.

- 80 customers were selected to participate in the 2019 GGP, 15 declined to participate for various reasons (moving, already owned back-up power, etc.).

- 41 of the 65 customers who participated in the 2019 GGP also completed the Post-Program Survey.
- 34 of the 41 experienced a PSPS in 2019 and all 34 successfully used their battery during the outage.
- **95.1%** of surveyed participants reported a growth in preparedness after receiving the goal zero yeti 3000.
    - *The remaining 4.9% had already reported their preparedness as a 10.*
- The self-rated preparedness average for the surveyed population **increased by 4.2 points**.

Remedy of Ignitions/Faults Revealed During Pilot: N/A

Expanded Use of Technology: SDG&E is expanding this program to make it eligible to all medical baseline customers within the HFTD, offering 1,250 of these portable battery and solar units to customers within the HFTD.

Advanced Protection – Falling Conductor Protection (WMP Section 5.3.3.2)
Status of Pilot: The Falling Conductor Protection (FCP) pilot is in the stages of strategic deployment within Tier 3 of the HFTD under "test mode" operation. In this mode, the Advanced Protection devices utilized for FCP will operate as designed, identify potential broken conductor conditions, and send various tripping signals and alarms to their respective endpoints, without actually operating any devices. This test mode is specifically designed to gauge the performance of this form of broken wire detection platform without incurring any unnecessary negative impacts to reliability. SDG&E currently has six distribution circuits in test mode operation with five more planned for 2020. As stated in its 2020 WMP, SDG&E plans to have FCP enabled on all HFTD Tier 3 circuits by 2023.

Results of Pilot: FCP has been shown to operate correctly and sufficiently in both the lab and field commissioning environments. Proper design, field communication infrastructure, and commissioning expertise has led to the successful deployment of the six test mode circuits with five more on the way in 2020. Currently, SDG&E is measuring performance by the amount of broken wire events that occur within the zone of protection of FCP circuits. If a broken conductor were to occur on a circuit operating in test mode, SDG&E would measure performance by the reaction of the Advanced Protection devices to that event, and whether or not they would have acted to isolate the event. To date, broken conductor events have not occurred in a FCP zone of protection, thus ultimate field performance measurements have not yet been realized.

Remedy of Ignitions/Faults Revealed During Pilot: SDG&E will use the data it receives from FCP broken conductor events to perform incident reviews as it currently does with all other protection operations throughout the system. The event record data produced by Advanced Protection devices will assist SDG&E subject matter experts in performing detailed event analysis to make recommendations to the various SDG&E planning, design and construction

organizations in situations where material improvements can be made outside of the protection scheme operation.

Expanded Use of Technology: SDG&E will continue to expand this technology throughout its service territory with a focus on the wildfire prone areas first. As noted above, SDG&E is planning to deploy this technology in the HFTD Tier 3 by 2023. Once that is complete, SDG&E plans to deploy the technology within the HFTD Tier 2. After all HFTD circuits are covered, SDG&E will look to target the non-HFTD circuits so this technology may be utilized for general public safety use cases, not just for wildfire risk reduction.

Strategic Undergrounding (WMP Section 5.3.3.16)

Please refer to Condition SDGE–4 for a detailed description of the strategic undergrounding pilot.

Drone Distribution Assessment (WMP Section 5.3.4.9.2)

Status of Pilot: The drone distribution assessment pilot program has flown and assessed over 36,000 structures of the nearly 40,000 overhead distribution structures within the HFTD Tier 3. This pilot was initiated in late 2019 with goal of using drones to take pictures of every structure within the HFTD Tier 3 by 2020. Based on the findings described in Section II.F – Condition Guidance-7 above, SDG&E plans on continuing this drone program. SDG&E would eventually like to expand the use of the drone program to the HFTD Tier 2 as well, however, given that the current annual O&M expenses for this program are high, SDG&E should target assessing less than 35,000 structures per year. In SDG&E's entire HFTD there are about 74,000 structures. SDG&E would like to continue this program beyond this pilot and is considering how to refine the inspection cycle to reduce costs. For example, if the poles per year cycle is reduced to a three-year program which would inspect approximately 25,000 structures, this would represent a 28% reduction in cost. Alternatively, a five-year cycle to inspect about 15,000 structures per year represents a 58% reduction in cost from the current pilot.

Results of Pilot: The quantitative analysis for this program in outlined in Section II.F: Condition Guidance-7 above.

Remedy of Ignitions/Faults Revealed During Pilot: Issues identified by drone inspections are handled as normal compliance jobs. They are categorized as either emergency (0-3 days), priority (3-30 days), or non-critical (30 days to 1 year).

Expanded Use of Technology: Based on the substantial findings from the drone program described in Section II.F: Condition Guidance-7, SDG&E believes the program should continue. But as mentioned above, since expenses associated with the 35,000 pole per year cycle rate is high, SDG&E is considering lowering the number of poles per year cycle to continue to get benefits of this premium inspection, but at a reduced annual cost.

Circuit Ownership (WMP Section 5.3.4.9.3)
Status of Pilot: The circuit ownership pilot provides the opportunity for SDG&E's field employees and management of field employees to submit circuit vulnerabilities via a Mobile Data Terminal (MDT) program or mobile application (both iOS and Android). Specifically, this program facilitates supplemental submission of circuit vulnerabilities (in addition to the existing inspection programs) so that they can be timely repaired, to prevent a potential ignition and minimize the risk of wildfire. This program accordingly allows SDG&E to leverage its workforce to self-report identified vulnerabilities related to its system. This pilot has been rolled out to select groups within SDG&E's Electric Regional Operations that have extensive knowledge of the electric system. These Electric Troubleshooters and Managers have the technology and information needed to pilot this program. This pilot was initiated in late 2019, however, since SDG&E was preparing for fire season at that time, it did not see large scale use by the target audience. This year, SDG&E is delivering a refresher training and sending additional communications to these employees, and will continue to pilot with this group for broader adoption.

Results of Pilot: There were two submissions in 2019, however, both were determined to not be included in this program, but rather followed up as non-emergency. SDG&E plans to communicate with the group that has been chosen to pilot and gauge the success of the program going forward.

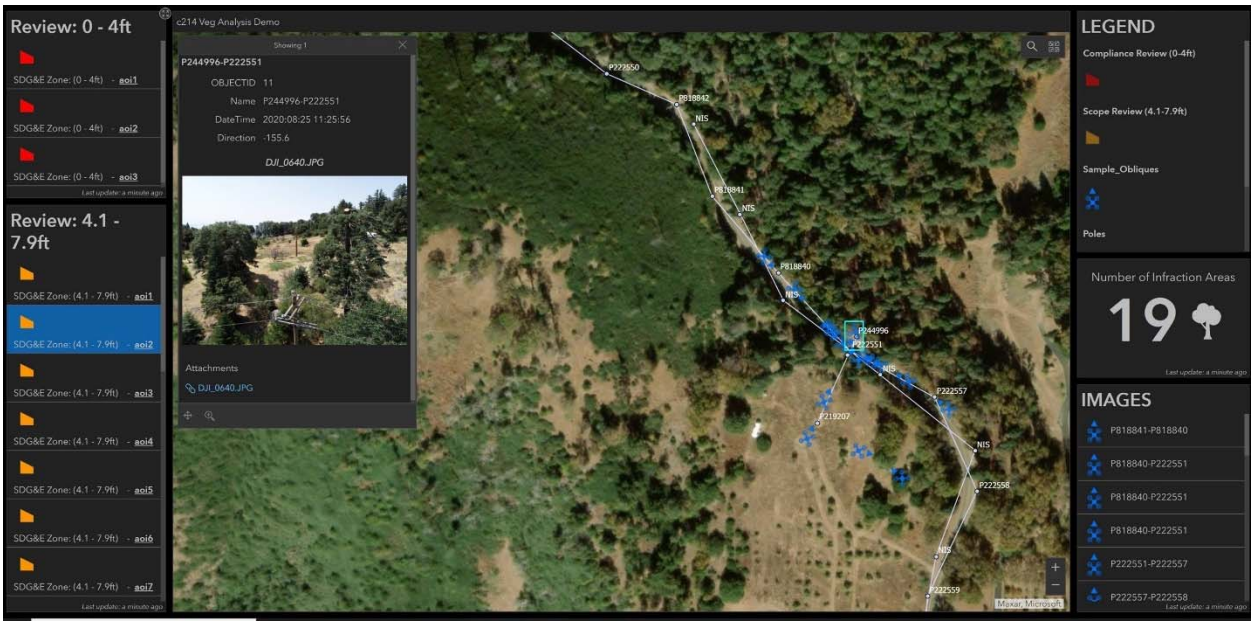
Remedy of Ignitions/Faults Revealed During Pilot: Once a submission by the pilot group has been identified, it is categorized within two days (unless identified as an imminent danger or hazard) as either a priority, emergency, or non-emergency. This prioritizes the prompt follow up of those priority and emergency submissions.

Expanded Use of Technology: N/A

Vegetation Management LiDAR (WMP Section 5.3.5.7)
Status of Pilot: SDG&E has initiated the use of LiDAR as a pilot program in 2020 to enhance its tree inspection activities. SDG&E began the pilot on a distribution circuit located on Palomar Mountain. To date, SDG&E has acquired LiDAR data on 100% of its overhead electrical facilities located within the HFTD. The LiDAR data is currently being analyzed and formatted to create three-dimensional modeling of the tree canopy surrounding the facilities. The information can be used to corroborate SDG&E's tree inventory data and strike potential, and to identify trees that may need further mitigation.

Results of Pilot: SDG&E has recently received the calculated clearance results of the LiDAR analysis on the Palomar pilot, which identified some tree-to-line clearances that were less than the SDG&E 10' requirements. SDG&E has sent foresters to verify the results of the analysis and validate the LiDAR findings. If confirmed, the LiDAR will be a valuable QA/QC tool to ensure proper radial clearance is obtained from vegetation to line.

Guidance 9 Figure 3
Example of LiDAR Image



Remedy of Ignitions/Faults Revealed During Pilot: No clearance violations or immediate trim needs were identified as part of this pilot. The zero to 4' clearances identified above were on covered secondaries and services (low voltage lines). If clearance issues were identified, they would be resolved per the normal vegetation inspection and follow up trim process.

Expanded Use of Technology: SDG&E utilizes LiDAR for transmission and distribution design as a core part of the design process. Based on the current progress of this pilot, SDG&E is seeing potential use cases as a QA/QC tool for vegetation management inspections. Depending on the results of the foresters checking the LiDAR analysis clearances that were identified, this pilot could be expanded for use as a QA/QC tool on vegetation management inspections.

Ignition Management Program (WMP Section 5.3.7.4.1)
Status of Pilot: In 2019, SDG&E established a pilot Ignition Management Program (IMP). In 2019, SDG&E employed a Fire Ignition Management Program Coordinator to implement and manage this program. The Ignition Management Program (IMP) is identifying areas of improvement to reduce the risk and occurrence of fire ignitions. The IMP has identified databases throughout the Company, and it is working to consolidate the information into a single source in an effort to utilize the information to conduct analytics and identify modes of failure as well as mitigation owners. In addition, the IMP follows up on all reported ignitions and equipment failures and is conducting an analysis to determine the cause of each ignition. The IMP is working closely with SDG&E engineering SMEs providing site analysis data in an effort to support equipment failure analysis. This data is used in conjunction with the data

collected from other internal stakeholders for use in determining failure modes and future analytics.

Results of Pilot: The program is continuing to progress toward broader adoption. This is based on the data gathering process that has been put in place and continues to be refined. Data, along with the events initiating the data, are being documented then filtered through the program and the program manager.

Remedy of Ignitions/Faults Revealed During Pilot: The process for reducing the frequency and consequence of ignitions is constantly being refined, and the program has established the initial path for analysis to be communicated to mitigation owners. SDG&E plans to integrate the findings of the program into its decision-making process for WMP risk reduction and hardening initiatives.

Expanded Use of Technology: When ignitions or faults have been identified through the IMP processes, SDG&E's Electric Engineering SME failure analysis team is notified, and a systematic analysis is conducted to determine the cause of the failure. When the cause of the failure is determined, the mode of failure is tracked for trends and reported to the mitigation owner to remedy the failure. The IMP is building a process to analyze failures that will include a Failure Mode Effect Criticality Analysis to further analyze data collected in the IMP process.

Fuels Management (WMP Section 5.3.5.5)
Status of Pilot: SDG&E continues to conduct in person audits on the award recipients and the work is currently 75% complete with the goals of completion before Q4 2020.

Results of Pilot: Success of this pilot is measured based on the completion of the projects associated with the award recipients. Additionally, establishing a selection process based on scoring criteria and strengthening the fire defense of the service territory has made the pilot a success.

Remedy of Ignitions/Faults Revealed During Pilot: N/A

Expanded Use of Technology: Documentation through imagery and gathering of information post fuels reduction work are being used to educate future decision making.

Vehicle Tracking (WMP Section 5.3.9.4.7)
Status of Pilot: SDG&E completed the installation of the Verizon Telematics vehicle tracking solution on 240 vehicles within Gas Operations, Fleet Services, and Electric Regional Operations in March 2020. SDG&E is in the process of collecting baseline data and analyzing the data to identify areas of opportunity for improvement. The pilot project has been slotted for full deployment to all remaining Fleet vehicles in Q4 of 2020 and Q1 2021.

Results of Pilot: SDG&E is in the process of analyzing the baseline data collected from the pilot project, but the Company has already identified opportunities for improvement including

employee safety metrics, distracted driver identification, idle mitigation, and improved maintenance response times (all reducing risk of ignition from our equipment), as well as having the ability to locate work crews and assets on a map at any given time. Tracking employee location in the Tier 2 and 3 High Fire Threat Districts is critical to ensuring their safety and support. SDG&E looks forward to providing an update on the quantifiable benefits in a future report.

Remedy of Ignitions/Faults Revealed During Pilot: Remedies of ignitions include the real-time ability to identify the closest appropriate resource during PSPS and other weather-related events to safely assess conditions for de-energization and re-energization reducing the risk of ignitions/faults during these conditions.

Expanded Use of Technology: Expanding this project fleet wide will provide greater situational awareness and resource management during weather, wildfire, and PSPS events. A next level technology is Sole Worker Tracking, which would provide real-time situational awareness of employee tracking once they exit their vehicle in the HFTD Tier 2 and 3 areas, again improving employee safety and resource management toward ignition risk reduction.

H. Condition Guidance-10: Data Issues - General

Electrical corporations shall ensure that all future data submissions to the WSD adhere to the forthcoming data taxonomy and schema currently being developed by the WSD. Additionally, each electrical corporation shall file a quarterly report detailing:

i. *locations where grid hardening, vegetation management, and asset inspections were completed over the prior reporting period, clearly identifying each initiative and supported with GIS data,*
ii. *the type of hardening, vegetation management and asset inspection work done, and the number of circuit miles covered, supported with GIS data*
iii. *the analysis that led it to target that specific area and hardening, vegetation management or asset inspection initiative, and*
iv. *hardening, vegetation management, and asset inspection work scheduled for the following reporting period, with the detail in (i) – (iii).*

SDG&E understands the WSD's desire to develop and require a consistent data taxonomy and schema for all electric utilities to use for WMP data submissions. The WSD has worked hard to produce its August 21, 2020 Draft Geographic Information System (GIS) Data Reporting Requirements and Schema for California Electrical Corporations (GIS Data Standards). SDG&E appreciates the WSD's acknowledgement that the "electrical corporations are at different stages of their data journeys and employ differing business practices, which may impact certain electrical corporations' ability to fully comply with the requirements in [the GIS Data Standards]" and that the WSD's employing a phased approach to full implementation of their GIS Data Standards.[9]

It is important to note that SDG&E's source data exists in multiple and disparate information systems. It will take time to fully create the capability to extract, transform, and load this data into a standard schema, and it will be a significant and costly effort as the source systems contain hundreds of tables, tens of millions of rows, and consist of gigabytes of data. For this Report, SDG&E had to use a manual, time and resource intensive, and burdensome process to gather as much as the requested data as possible, in the specific format outlined in the GIS Data Standards. SDG&E is investigating an investment in a technical data solution that would automate some of this manual consolidation of data from different sources. This data project is expected to be a longer-term solution however, and SDG&E expects to continue to perform this manual data gathering approach for this Report and subsequent quarterly reports in the near future.

Please see Confidential Appendix C: Guidance-10 GDB, which is a geodatabase file containing the available SDG&E's WMP reportable data in the schema provided by WSD. In addition, Appendix D: Guidance-10 Data Status Report provides a line by line accounting of the data

[9] GIS Data Standards at p. 6. Available at: ftp://ftp.cpuc.ca.gov/WSD/GISguidance/WSD%20GIS%20Data%20Reporting%20Requirements_DRAFT_20200821.pdf

included within this Report, as well as provides an explanation of data gaps and timelines for gathering data not currently included in Appendix C.

SDG&E's approach to prioritizing wildfire mitigation work in 2020 was motivated by multiple drivers and varied across different types of projects:

- For overhead hardening, the work performed was prioritized through SDG&E's Wildfire Risk Reduction Model (WRRM) and targets high risk assets in the areas of highest wildfire consequence, typically areas within Tier 3 of the HFTD and some areas within Tier 2 of the HFTD.
- SDG&E's underground programs were prioritized to both reduce fire risk and maintain power to community centers and essential customers during PSPS events.
- SDG&E's additional sectionalizing programs were prioritized in order to mitigate PSPS and were executed in both the HFTD and the wildland urban interface (WUI).
- The complete analysis on high risk species for enhanced vegetation management is provided in SDGE-14.

For the engineering and construction of prioritized work, SDG&E begins all prioritized work planned for a given year simultaneously. Depending on project specific constraints however, it is possible for lower priority projects to be completed before higher priority projects. The Cleveland National Forest (CNF) fire hardening project is a clear example of this situation. It is one of the highest risk areas in SDG&E's service territory, but due to permitting constraints, it has taken many years to obtain approval to fire harden lines within CNF. In contrast, lower priority jobs that have less project specific constraints can be designed and constructed within a one-year time frame.

I. Condition Guidance-11: Lack of Detail on Plans to Address Personnel Shortages

In its first quarterly report, each electrical corporation shall detail:

i. *a listing and description of its programs for recruitment and training of personnel, including for vegetation management;*
ii. *a description of its strategy for direct recruiting and indirect recruiting via contractors and subcontractors; and*
iii. *its metrics to track the effectiveness of its recruiting programs, including metrics to track the percentage of recruits that are newly trained, percentage from out of state, and the percentage that were working for another California utility immediately prior to being hired.*

Programs for Recruitment and Training of Personnel

SDG&E's workforce is a reflection of the communities served. Guided by its values – Do the Right Thing, Champion People and Shape the Future – SDG&E continues to lead change that will reinforce and demonstrate its deep commitment to diversity and inclusion. SDG&E has multi-faceted recruiting programs for all areas of the Company including wildfire mitigation and vegetation management positions. SDG&E's inclusive programs are evidenced by its diverse workforce and include posting all of our external job opportunities on various job boards such as Circa, formerly Local Job Network, whose mission is to serve as a catalyst for companies to build powerful, diverse teams by sharing openings with a network of over 17,500 community-based organizations (CBOs).

In addition, SDG&E leverages other websites and social media outlets for passive recruiting, outreach, and advertisement of wildfire mitigation and vegetation management positions, including Environmental Career.com, Energy Central, LinkedIn, Indeed, Jobing.com, Jobilize, Instagram, Facebook and YouTube. These platforms enable SDG&E to reach and attract a broad and diverse candidate pool.

Building strong and effective relationships with diverse organizations is another part of our recruiting program. A few of the organizations SDG&E partners with include the Association of Women in Water, Energy and Environment (AWWEE), National Association of Women in Construction (NAWIC), and National Society of Hispanic MBAs and Business Professionals (PROSPANICA). SDG&E also focuses on military outreach and works with organizations such as Military MOJO and Hire GI, and support programs like Onward to Opportunity. SDG&E partners and supports these organizations in various ways that include providing financial funding, attending events and hiring participants, helping them to expand their membership and collaborating with them on events by facilitating workshops and serving as panels.

For SDG&E Electric Regional Operations (not including vegetation management), SDG&E has a Memorandum of Understanding (MOU) with the International Brotherhood of Electrical Workers (IBEW) Local 465 outlining recruiting and internal promotion commitments for calendar years 2020-2022. For each year in scope for the MOU, SDG&E will recruit and/or

promote: eight New Hire Journeyman Lineman, 24 New Apprentice Lineman, 24 New Line Assistants. Electric Regional Operations is also partnering with local community and line school trade colleges (*e.g.*, San Diego Community College and UEI College) to promote the career path and encourage development and improvement of the programs offered through these institutions. SDG&E Human Resources and Electric Regional Operations routinely recruit directly from the line school.

SDG&E's Vegetation Management Program (VMP) includes an internal workforce of eight International Society of Arboriculture (ISA) Certified Arborists including Manager, Supervisors, Foresters and Contract Administrators responsible for the development, oversight, and execution of its utility operations. SDG&E recently hired a WMP Lead Forester to oversee the pre-inspection activities within the HFTD and is currently in the process of hiring four internal inspectors to perform additional inspections within the HFTD. These additions to the workforce are an initiative to manage operations within the HFTD separate from routine, non-HFTD inspection activities.

SDG&E internal VMP employees receive annual training on multiple environmental, safety and compliance topics. Training modules include the SDG&E Natural Communities Conservation Plan (NCCP), fire extinguisher use, SDG&E's Wildfire Safety work procedures (ESP113.1), NERC Reliability Standards, CPUC Affiliate Compliance, Smith Driver training, and Diversity training.

Strategy for Direct and Indirect Recruiting Contractors

Electric Contractors

Construction: Most of the electric contractors SDG&E utilizes, have been in place for several years. Any additional contractors go through a very detailed and thorough vetting process with SDG&E's Supply Management and SDG&E's Distribution Construction Management (DCM) departments, including multiple rounds of interviews. They are sourced through SDG&E as master service agreement (MSA) Holders (3-5 year negotiated time and equipment (T&E) rates) and should have the ability to hire as many crews as necessary to complete the work requested of them (all workers are sourced through various Unions). As far as subcontractors are concerned, SDG&E does not subcontract general contractor responsible work because prime contractors are required to carry $200 million in Fire Insurance, which drastically limits the pool of qualified contractors.

- SDG&E through Supply Management will solicit a list of qualified contractors for electrical workforce support.
- Once a list is established, a Request for Information (RFI) will be requested to each selected contractors to obtain a general information about the company.
- Once the RFI is received, DCM and Supply Management will review the documents and will decide on which company to qualify for an interview for the vetting process.
- All selected contractors will go to an interview and decision will be made through DCM and Supply Management.

Support Staff: Staff Augmentation and construction management support personnel are sought through companies such as Jingoli, Progressive, Herman-Weissker in order to provide SDG&E with the best available talent in the market today. Contractors are thoroughly vetted through Supply Management and DCM prior to commencing work.

- Staff Augmentation / Non-Staff Augmentation personnel will be vetted and requested through the MSA holders for staff personnel recruitments.
- Resume and personal qualifications will be submitted to DCM for review.
- DCM will review resume and documents and will decide on which candidate to qualify for an interview.
- DCM will conduct interviews and decisions will be made for job offers.

Vegetation Management Contractors

SDG&E is currently in its second decade of continuous contractual relationships with each of its contracted vendors, whose workforce consists of dedicated professionals educated and trained in utility arboriculture. SDG&E's two tree trim contractors utilize IBEW Local 465 to recruit individuals. Both contractors have a detailed and documented training program for preparing incoming personnel for line-clearance-tree-trimming certification, and they also offer employees career advancement opportunities. Recent Senate Bill (SB) 247 dramatically increased prevailing wages for utility tree workers and has contributed greatly to employee retention and a much more robust hiring pool.

All VMP contractors perform annual, internal company training including hazard tree assessment, customer service, and environmental regulation. Each contractor maintains an updated company fire plan in accordance with contractual requirements and presents it to its workforce as part of their annual fire prevention and awareness training, which includes the proper use of fire personal protective equipment (PPE). Tree contractors provide local, dedicated safety managers to oversee company safety activities and to provide the latest training and best practices.

SDG&E and its tree contactors are currently participating in a statewide initiative with multiple utility contractors and academia to develop an accredited training program and college-level courses to educate and train individuals about utility line clearance operations. This program recognizes and increases the professionalism and criticality of safe, line-clearance activities.

Each of the Vegetation Management contractors participate in a joint Southern California Utility Safety Alliance (SCUSA). This group consisting of a multitude of represented electrical contractors meet monthly to review safety best practices within the industry and includes recruitment and retention challenges and solutions.

Metrics – Recruiting Program Effectiveness

SDG&E does not currently track the metrics related to the effectiveness of its recruiting programs.

J. Condition Guidance-12: Lack of Detail on Long-Term Planning

In their first quarterly report, each electrical corporation shall detail:

i. *its expected state of wildfire mitigation in 10 years, including 1) a description of wildfire mitigation capabilities in 10 years, 2) a description of its grid architecture, lines, and equipment;*
ii. *a year-by-year timeline for reaching these goals;*
iii. *a list of activities that will be required to achieve this end goal; and*
iv. *a description of how the electrical corporation's three -year WMP is a step on the way to this 10-year goal.*

As a recognized leader in wildfire mitigation, SDG&E's vision for wildfire mitigation continues to focus on reducing the risk of wildfires as well as reducing the impacts of PSPS to customers. While SDG&E aspires to the goal of minimizing the need for PSPS over the next 10 years to the greatest extent practicable, California continues to experience increasing levels of risk as a result of climate change. As such, SDG&E will continue to modernize its system to mitigate the risk of wildfires and build a more resilient grid for the future. But PSPS may continue to be part of SDG&E's portfolio of mitigation options to be implemented as a measure of last resort to protect public safety.

To achieve its vision, SDG&E will focus on enhancing its data analytics capabilities across the organization to continue to support a more granular view of risk across its system. This will include better integration of data captured over the years from its weather stations and situational awareness tools in addition to new data from new technology applications. This enhanced data analytics capability will support a better understanding of risk across the system and allow for improved optimization of SDG&E's resources by allowing more refined targeting of mitigations, enhanced alternatives analysis as well as prioritization of its mitigations based on risk.

SDG&E continuously seeks input and guidance both internally and externally on the Company's vision and long-term roadmap for maturing its wildfire mitigation capabilities. As demonstrated in its 2020 WMP, SDG&E provided some high-level objectives for each of the ten categories of capabilities depicting its vision for enhancing its program in the 2020 WMP cycle and by 2030. To provide further detail, SDG&E undertook an extensive effort across the Company to build more refined objectives and annual timelines to portray its vision for maturing its wildfire mitigation capabilities over the next 10 years. While this effort lacks certainty due to the long timeframe and the rapid changes in technologies, evolving regulatory and legislative efforts, SDG&E views this as a guiding vision that it will continue to work towards and develop as time passes.

In the following sections, SDG&E sets forth its current view of how it plans to mature its capabilities in each of the ten categories outlined in its 2020 WMP with the emphasis that it will continue to update this vision and timeline to incorporate new technologies, methodologies

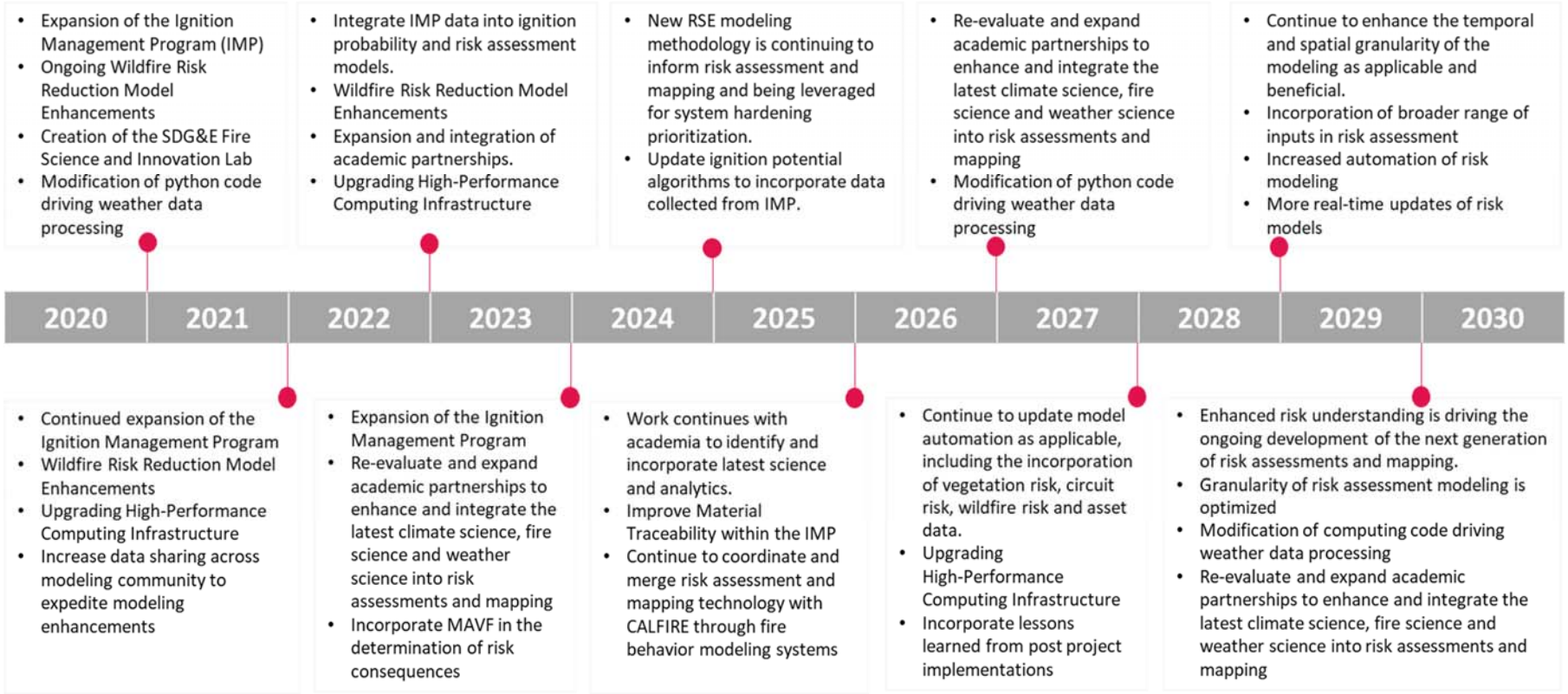
and best practices identified in consequent years and as the dynamic world of wildfire mitigation continues to evolve. As such, the response to this deficiency is structured in accordance with each of the ten categories below.

Risk Assessment & Mapping – State of Capabilities in 10 Years

Risk Assessment and Mapping capabilities are foundational elements of enhancing SDG&E's wildfire mitigation program. As the company continues to mature its risk assessment and modeling capabilities, its focus will include increasing granularity and accuracy in assessments to better manage the wildfire risk, as well as incorporating broader ranges of inputs in risk assessment. Pursuits in automation will enable more real-time updates to its risk maps which will facilitate scenario planning and focus mitigation efforts.

By 2030, SDG&E expects to expand its academic partnerships to enhance its risk assessment capabilities by integrating the latest intelligence related to climate, fire and weather into its models. SDG&E will increase automation and enable real-time learning capabilities to continue to enhance its algorithms. Additionally, while SDG&E has already established asset-level risk assessments for key assets, it plans to further enhance its granularity by 2030 to incorporate assets-level analyses and to better understand risk at granularities ranging from asset level to system-wide so as to enable a broader view of risk tailored to various applications. A year-by-year timeline of SDG&E's roadmap for maturing this category is provided below.

Guidance 12 Figure 4
Risk Assessment & Mapping – Annual Timeline



Risk Assessment & Mapping – List of Activities

1. The continued development of ongoing key initiatives that enhance our understanding of wildfire risk such as:
    a. Climate change risk analysis
    b. Enhanced weather modeling and forecasting capabilities
    c. Improvements to fuel moisture assessments and modeling
    d. Continued development of the Ignition Management Program
    e. Ongoing developments and enhancements to the fire behavior modeling capability and the resulting consequence modeling if fires occur
2. Ensure that the latest science-driven understanding of SDG&E's wildfire risk is integrated into the ongoing development of the next generation of RSE models.
3. Improve the wildfire risk assessments through leveraging the MAVF development and using historical data and expert input.
4. As applicable, continuously focus on the identification of new risk drivers, increased the granularity in risk assessments and increased the automation and updates of risk modeling as applicable and beneficial to decision making.
5. Enhance and integrate technology system to enable real time display of risk and "what-if" scenario planning

Risk Assessment & Mapping – 2020 WMP

SDG&E's 2020 WMP is foundational to achieving the Company's 10-year plan for expanding upon SDG&E's robust risk assessment and mapping capabilities. SDG&E's capability to increase the accuracy and usefulness of risk mapping is dependent upon a very strong foundational understanding of the risk. SDG&E has in the past, and will continue in the future to integrate and analyze climate, fire and weather related data for incorporation of the best possible data into the risk assessment and mapping tools for ongoing decision support.

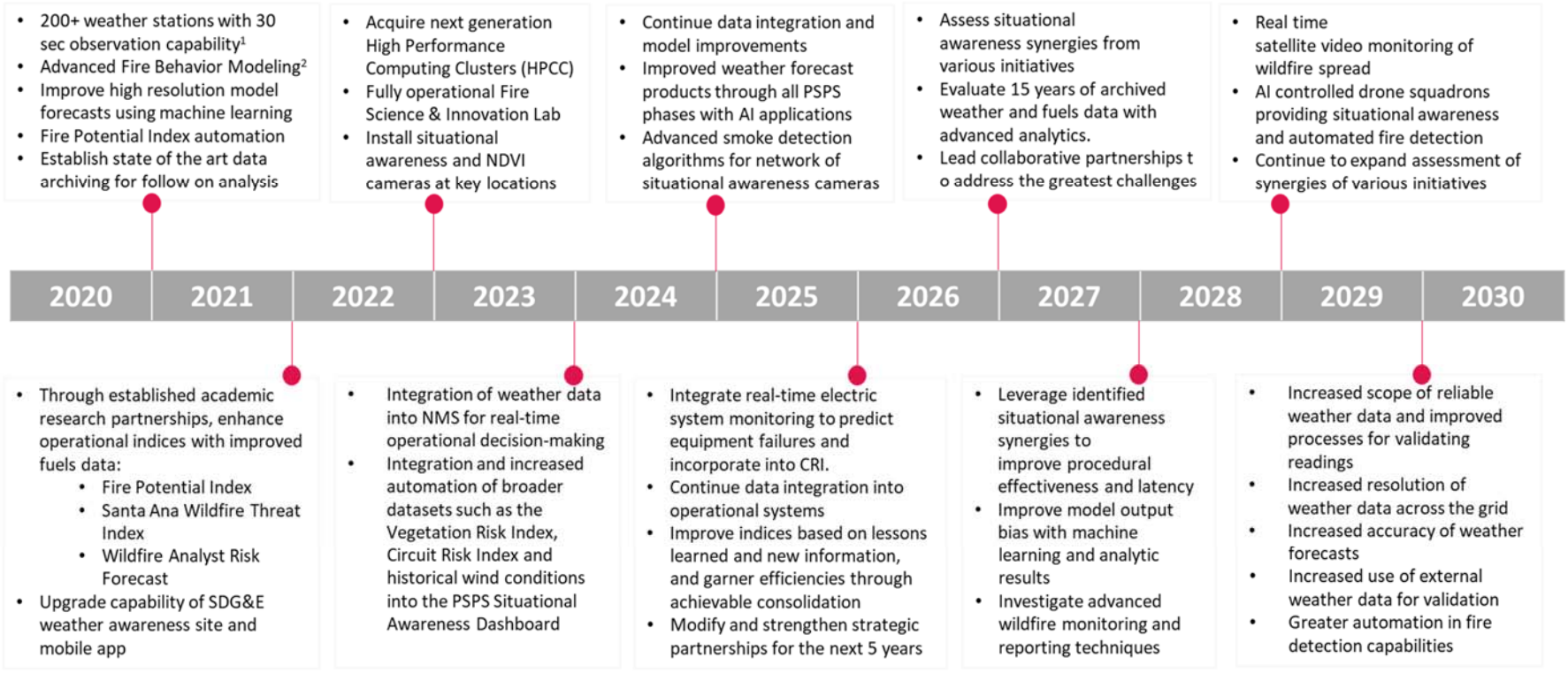
In addition to the integration of the latest science, SDG&E is already leveraging its enhanced understanding to develop the next generation of risk-based RSE model. These models will be continuously refined and improved moving forward. Particular focus will be given to increasing the granularity of the model, establishing new principal components for the modeling as applicable, and increasing the granularity and accuracy of the modeling and resultant mapping. The innovations and integration of science and data that is happening in the current WMP can and will be developed further in future WMPs.

Situational Awareness and Forecasting - State of Capabilities in 10 Years

As SDG&E continues to enhance its situational awareness capabilities, it will focus on increasing the scope of reliable weather data, improve its process for validating readings, increase the resolution of weather data across the grid with the overall objective of increasing accuracy of its forecasts. By 2030, SDG&E expects to advance its fire behavior modeling capabilities, automate its Fire Potential Index and invest in additional technologies such as NDVI cameras,

enhanced smoke detection capabilities in cameras and enable real-time satellite monitoring of wildfire spread to aid with its mitigation and response measures in the future. A year-by-year timeline of SDG&E's roadmap for maturing this category is provided below.

Guidance 12 Figure 5
Situational Awareness and Forecasting – Annual Timeline



1 Weather network modernization and expansion
2 Integration of disparate dashboards of weather and camera data into Wildfire Analyst Software

Situational Awareness and Forecasting – List of Activities

1. Identify gaps in meteorological observation coverage and continue new station installations
2. Develop a scalable, cyclic plan of weather station maintenance and modernization
3. Incrementally enhance all data gathering capabilities to achieve increasing levels of granularity
4. Innovate across applications and lead California in wildfire forecasting, modeling, and mitigation
5. Build on existing data share and archiving initiatives and expand joint ventures with the research community
6. Leverage utility best practices in situational awareness innovations across California
7. Utilize artificial intelligence to optimize across categories of mitigations based on risk spend efficiencies
8. Continue to expand into space-based solution to enhance situational awareness and to improve indices
9. Improve desktop and mobile visualization to accommodate cutting edge data analytics and management
10. Exploit rapidly changing, wide-spread drone surveillance, imaging, and weather observation capabilities

Situational Awareness and Forecasting – 2020 WMP

The Situational Awareness and Forecasting capability at SDG&E is class leading and robust, representing a solid technological and data rich foundation in which to build the next generation of advanced prediction and analytics. With a weather network exceeding 200 stations in only 4,100 square miles and collecting over 28,000 observations per day, this data helps initialize six different high-resolution models operating on 3 supercomputers that generate nearly 200GB of daily data. This data is archived for accessibility and findability through a joint venture with the San Diego Super Computing Center and represents the first of its kind to advance wildfire science and research.

The data is foundational to fire potential and fire weather indices that are based on fuels and weather. Further automation of product generation coupled with an unending quest for increased resolution will continue to refine and innovate early warning tools of impending fire risk. In addition to increased data collection and improved post processing for product refinement, in-situ sensor observations from fixed multi-spectral cameras and airborne drone assets will be a data multiplier demanding greater management and analysis.

Grid Design and System Hardening – State of Capabilities in 10 Years

Over the next 10 years, SDG&E will continue to identify the highest risk areas to apply specific mitigation efforts, including mitigation strategies such as: strategic undergrounding; overhead system hardening such as covered conductors, sectionalizing or circuit reconfigurations;

enhanced vegetation management, and fuels management; and backup generators and microgrid solutions. These mitigation solutions will focus on improving public safety by reducing the risk of wildfire associated with utility infrastructure, all while reducing the PSPS impacts to customers.

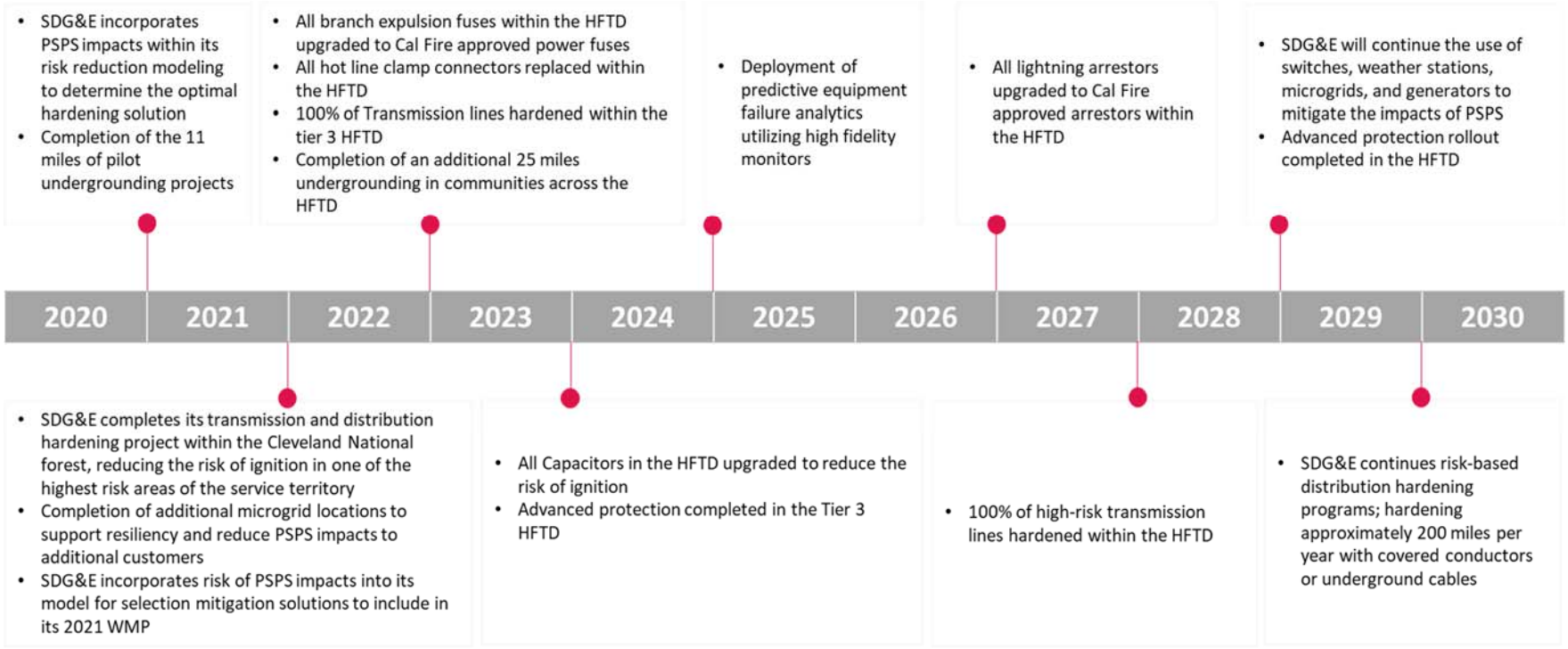
Within this 10-year period, SDG&E's specific equipment programs – that include capacitors, fuses, hot line clamps, and lightning arrestors – will be 100% converted to CAL FIRE approved equipment or other fire safe standard within the HFTD. During this 10-year period, SDG&E also plans to complete the hardening of its transmission system, starting with completing the Tier 3 by 2022, and then completing the Tier 2 by 2027. SDG&E still has over 2,800 miles of unhardened overhead distribution located within the HFTD.

SDG&E will utilize its improved risk modeling to prioritize its core mitigation strategies (strategic undergrounding, covered conductor, and traditional hardening) in a way that mitigates the greatest risk first. SDG&E's new risk model now includes the PSPS impacts to customers, which improves the value of mitigations like undergrounding and covered conductor that not only significantly reduce the risk of wildfire, but can also do so in higher risk operating conditions, allowing for more lines to stay energized during high risk operational periods. The new models are calling for a shift in hardening strategy, with less traditional hardening, and more covered conductor and undergrounding in SDG&E's 10-year hardening plan.

The enhancement to the model to incorporate the risks associated with PSPS impacts to customers means that additional mitigation strategies such as microgrids and backup generations can be fully evaluated against more traditional hardening methods to determine the most appropriate solution. In addition to its core hardening strategies, SDG&E will be building out its advanced protection capabilities and communication network across the Tier 3 HFTD, and eventually the Tier 2, providing additional risk reduction. SDG&E's hardening programs reduce the risk of a fault occurring in the first place, and if one does occur, SDG&E's advanced protection program reduces the chance that the fault actually leads to an ignition.

The 10-year plan also includes the deployment of new monitoring technology that looks at electrical property anomalies to try and predict system faults before they occur, providing yet another layer of fire hardening protection. As SDG&E completes these programs, SDG&E will continue to look at data on at least an annual basis to measure the effectiveness of its mitigations. In most cases, this is done by measuring the reliability performance of electric assets before the hardening was completed, divided by the number of years it was operated in this manner to create a rate, and then comparing that to the reliability performance rate after hardening was completed. SDG&E's risk models are then updated with the latest effectiveness measures based on actual data, to ensure SDG&E continues to prioritize the most efficient mitigations. A year-by-year timeline of SDG&E's roadmap for maturing this category is provided below.

Guidance 12 Figure 6
Grid Design and System Hardening– Annual Timeline



Grid Design and System Hardening– List of Activities

1. Enhance understanding of risk across system to better target efforts including strategic undergrounding, overhead system hardening, sectionalizing and implementation of microgrid solutions.
2. Convert all capacitors, fuses, hot line clamps and lightning arrestors to CalFire approved equipment or other fire safe standards in the HFTD
3. Complete transmission hardening efforts
4. Build out advanced protection capabilities
5. Build resiliency in the grid by incorporating microgrids at strategic locations

Grid Design and System Hardening– 2020 WMP

SDG&E's three-year WMP includes significant milestones along the way to SDG&E's 10-year goal. Among the most significant milestones is the completion of the fire hardening programs within the Cleveland National Forest (CNF). This geographic location has some of the highest wildfire consequence risk within the entire service territory, and SDG&E has spent over 10 years in design, permitting, and construction to move this project forward. The project is scheduled for completion in 2021 and represents significant wildfire risk reduction. This includes the removal of a transmission line near Boulder Creek and Sill Hill, areas where there is an abundance of dry fuels, very poor access for suppression efforts, and that consistently experience the highest level winds in SDG&E's service territory. This project also has PSPS impact reduction benefits by hardening transmission lines into that Descanso Substation, that would occasionally see PSPS exposure due to the high winds near the unhardened CNF transmission lines.

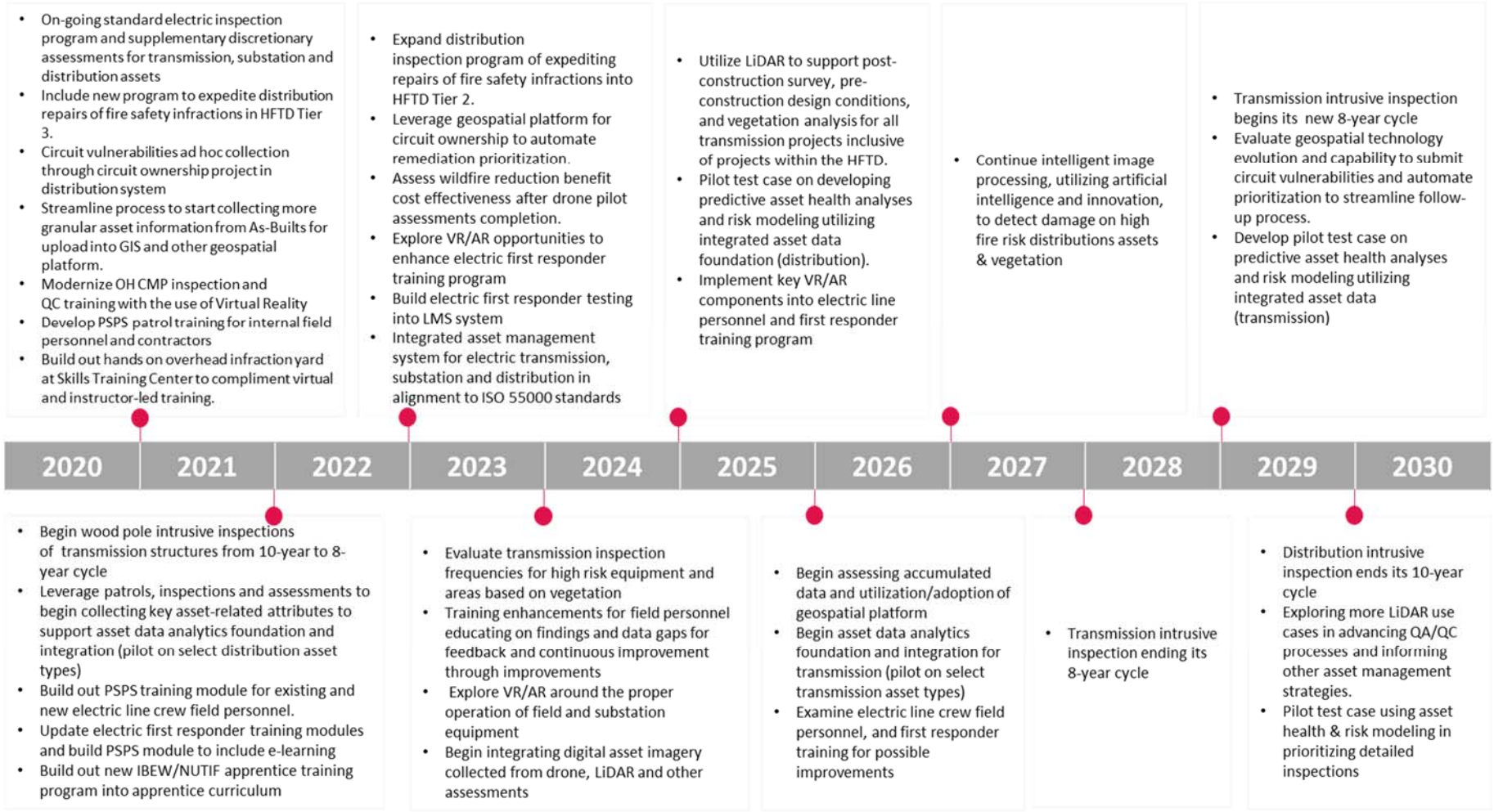
In addition, in the three year period, SDG&E is launching the strategic undergrounding program and covered conductor program, which will become the preferred strategies based on SDG&E's new risk model and hardening approach that focuses both on wildfire risk reduction and mitigating PSPS impacts to customers. SDG&E's new model now tranches risk at the circuit segment level, which coincides with how SDG&E operates the system during high risk events. Now that SDG&E will be hardening whole circuit segments versus high risk assets, customers will see more tangible benefits of hardening in the form of reduced PSPS.

In addition, SDG&E is making significant progress on its high-risk equipment replacement program, including the forecasted completion of its branch fuse replacement programs within the HFTD in 2022. This three-year period will see the beginning of the capacitor and lighting arrestor replacement programs within the HFTD, as well continued progress on the hot line clamp replacement program, targeting risk reduction on the types of equipment that have led to ignitions in the past. Finally, this three-year period will expand the advanced protection working towards a goal of apply this protection to every circuit within the Tier 3 HFTD by 2023.

Asset Management and Inspections – State of Capabilities in 10 Years

As SDG&E continues aligning its practices with ISO 55000, SDG&E's 10-year asset management vision focuses on enhancing data collection and analysis to better understand asset health, enable predictive modeling and improve its inspection programs based on quantitative risk assessments. By 2030, SDG&E expects to continue its inspection programs while continuing to further integrate and expand use of new technologies such as infrared, LIDAR, drones and intelligent image processing, along with lessons learned and procedural updates. In addition, SDG&E expects to have established asset management plans with predictive analytics for each of its asset classes and types to inform its asset management and risk mitigation strategies. A year-by-year timeline of SDG&E's roadmap for maturing this category is provided below.

Guidance 12 Figure 7
Asset Management and Inspections – Annual Timeline



Asset Management and Inspections – List of Activities

1. Continue existing standard electric inspection program, which includes existing non-discretionary routine patrols and inspections, to serve as both wildfire mitigation and control. These activities include:
    - Performing patrols and detailed inspections on transmission, substation and distribution systems, with heightened focus in completing Tier 3 areas before wildfire season.
    - Ongoing evaluation of inspection frequencies considering equipment type, location, historical inspections, highly vegetated areas, and eventually when asset health and risk analyses are available.
    - Intrusive inspections for transmission and distribution wood structures on a ten-year cycle, while reviewing opportunities to transition to eight-year cycle, further cycle changes or additional targeted asset inspections.
2. Continue existing supplementary discretionary assessments to further observe, collect more asset type related data and augment the standard electric inspection program. These activities include:
    - Pole loading assessments in transmission and distribution structures as additional follow-up verification and to support further development of asset health analysis and risk modeling.
    - QA/QC as additional proactive assessments to identify potential structural and mechanical problems and heightened focus in areas where maintenance would improve fire safety and reliability.
    - Enhance annual infrared (IR) assessments by increasing the number of distribution structures in heavily vegetated areas, which experience high number of faults and circuits with high previous findings, while continuing existing IR assessments on transmission structures.
3. Expansion of enhanced electric assessment program, which includes supplementary discretionary assessments with innovative use of new technologies, streamlined processes and/or new industry best practices. These activities include:
    - Refinement of circuit ownership project in distribution system to identify ad hoc circuit vulnerabilities and prioritize remediations by fire risk criticality based on HFTD areas, while leveraging geospatial platform for data collection and automated prioritization.
    - Evaluation of drone pilot assessment upon completion to determine appropriate cycle/frequency, verify quantity & quality of collected data and wildfire reduction benefit cost effectiveness.
    - Leveraging imagery data collection from drone assessments to support transmission and distribution fire hardening efforts.
    - Continue intelligent image processing, utilizing artificial intelligence and innovation, to detect damage on high fire risk distributions assets & vegetation

- LiDAR acquisition and inspections to continue support post-construction survey, pre-construction design conditions, and vegetation analysis for all transmission projects inclusive of projects within the HFTD.

4. Develop asset data foundation integrating key asset-related attributes to enable predictive asset health analyses and risk modeling and improve inspection/assessment strategies and prioritization.
    - Leverage patrols, inspections and assessments to collect asset-related data attributes
    - Evaluate and streamline process to start collecting more granular asset information from As-Builts for GIS geospatial platform upload.
5. Continue monitoring and auditing of standard electric inspection programs
6. Develop training enhancements for field employees
    - Implement IBEW/NUTIF apprentice program
    - Build out OH CMP inspection and QC Virtual Reality/Augmented Reality (VR/AR) training program
    - Build out OH QC infraction yard at Skills Training Center for hands on application
    - Modernize electric first responder training program to include e-learning, VR/AR
    - Build out all training in LMS to provide findings/follow-ups and for continuous improvement.
    - Integrate PSPS and ICS processes into all facets of electric line crew field personnel and first responder training

Asset Management and Inspections – 2020 WMP

SDG&E's 2020 WMP, including the key initiatives listed under Asset Management and Inspections section, continues to reinforce the safe management and reliable operations of electric assets. In alignment to the Company's 10-year plan, SDG&E intends to continue the existing standard electric inspection program, which includes existing non-discretionary routine patrols and inspections, to serve as both wildfire mitigation and control. SDG&E will also continually perform supplementary discretionary assessments to further observe, collect more asset type related data, and augment the standard electric inspection program. These supplementary assessments allow incremental validation of the asset condition or state flagged for follow-up during the standard electric inspection program.

SDG&E leverages technological advancements to further expand the current enhanced electric assessment program, which includes the supplementary discretionary assessments. SDG&E examines opportunities for innovative use of new technologies, streamlining processes or adopting new industry best practices to make asset management and inspections adaptable to ever-changing regulatory, compliance and wildfire mitigation direction. For feedback and continuous improvement, SDG&E intends to continually perform monitoring and audit of standard electric inspection program, and to utilize findings to develop training enhancements

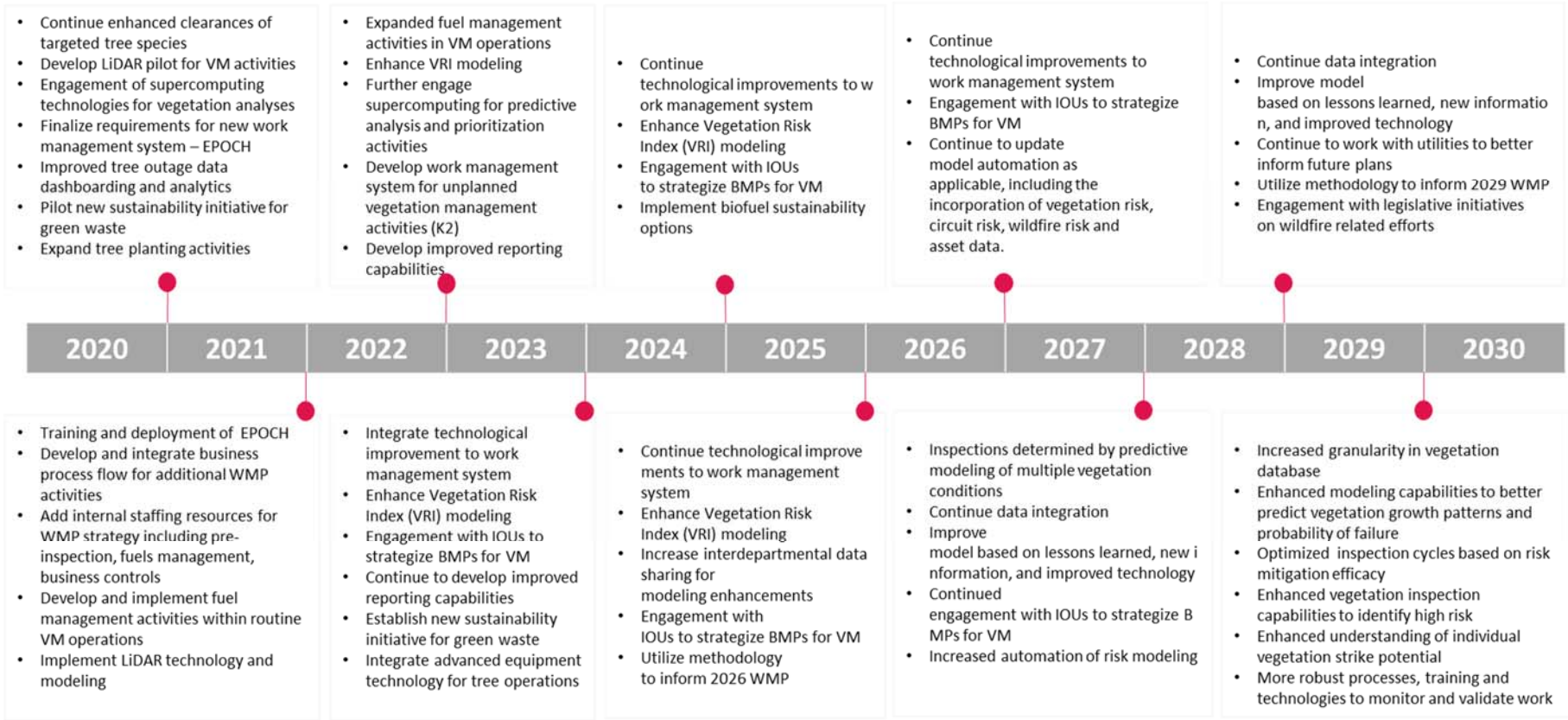
for field employees instrumental in performing these critical asset management and inspections. To reinforce data-driven performance evaluation, sustainable and integrated risk-informed asset management, SDG&E is pursuing to align to ISO 55000 standards through the implementation of the Asset Integrity Management (AIM) Program. As one of the several key workstreams of the AIM Program, asset data foundation project is in progress in integrating key asset-related attributes to enable predictive asset health analyses and risk modeling, and with the ultimate goal of providing data and insight to optimize inspection/assessment strategies and prioritization.

Skills Training Center has a robust plan to further enhance our Overhead QC inspection program in 2020 through the use of Virtual Reality and a physical build out of our Skills training yard with 15 poles and infractions in 2020. In 2021 further enhancement will take place to enhance our Electric Troubleshooter Curriculum to promote learning and retention, tools such e-learning and exploring the use 2.5D and VR/AR where applicable will be utilized. In addition, PSPS training is being developed and implemented to prepare our internal employees and contractors to support all operational facets of PSPS. Finally, in August 2020 an eight-week Climbing School and Advanced Secondary Apprentice class session was launched and for the first time, the Line school Instructors and Apprentices began using the newly structured curriculum obtained from the National Utility Industry Training Fund (NUITF) a product of the Electrical Training Alliance and the IBEW that was modified by SDG&E's internal instructional design team to ultimately develop a best in class lineman.

Vegetation Management Plan – State of Capabilities in 10 Years

SDG&E will continue to maintain its vegetation management program, while incorporating new and improved approaches. By 2030, SDG&E expects to further increase the granularity of its vegetation database, enhance modeling capabilities to better predict vegetation growth patterns and probability of failures, optimize its vegetation inspection cycles based on risk, enhance its vegetation inspection capabilities to better identify and target high risk areas, evolve its understanding of tree strike potential, and build more robust processes, training and technologies to monitor and validate work performed by its crews. A year-by-year timeline of SDG&E's roadmap for maturing this category is provided below.

Guidance 12 Figure 8
Vegetation Management Plan – Annual Timeline



Vegetation Management Plan – List of Activities

1. Engage contractors to facilitate local recruitment and training of qualified resources
2. Implement the Strategic workforce plan to increase internal resources for additional WMP activities
3. Engage IT for enhancements to the Work Management tools to support current and future WMP activities
4. Outreach and education with customers and agencies to achieve enhanced clearances and fuels reduction
5. Engage in legislation supporting language that aligns with the IOU's WMP initiatives
6. Pilot technological solutions that help validate inspection and audit results
7. Engage IT to build data integration capabilities to enable more real-time data updates and dashboards
8. Development of system sharing capabilities across company, agencies, IOU's and research communities with embedded security protocol
9. Engagement of IOU's on best practices in vegetation management operations
10. Design and implement data analyses to justify risk spend efficiencies
11. Expand VRI and supercomputing technologies for improved predictive modeling
12. Where possible, increase the granularity in risk assessments and increase the automation of risk modeling as applicable and beneficial to decision making

Vegetation Management Plan – 2020 WMP

SDG&E has nearly completed the design and development of its new electronic work management system (EPOCH), which will greatly enhance performance and efficiency, including improved mapping functionality, asset (trees/poles) geolocating, and data management. SDG&E continues to refine its application of expanded trim clearances at the tree asset level applying site-specific considerations for risk reduction and tree health. SDG&E continues to expand its use of data to improve operational awareness and management options, including the initial engagement of external supercomputing analyses, and further refinement of its Vegetation Risk Index.

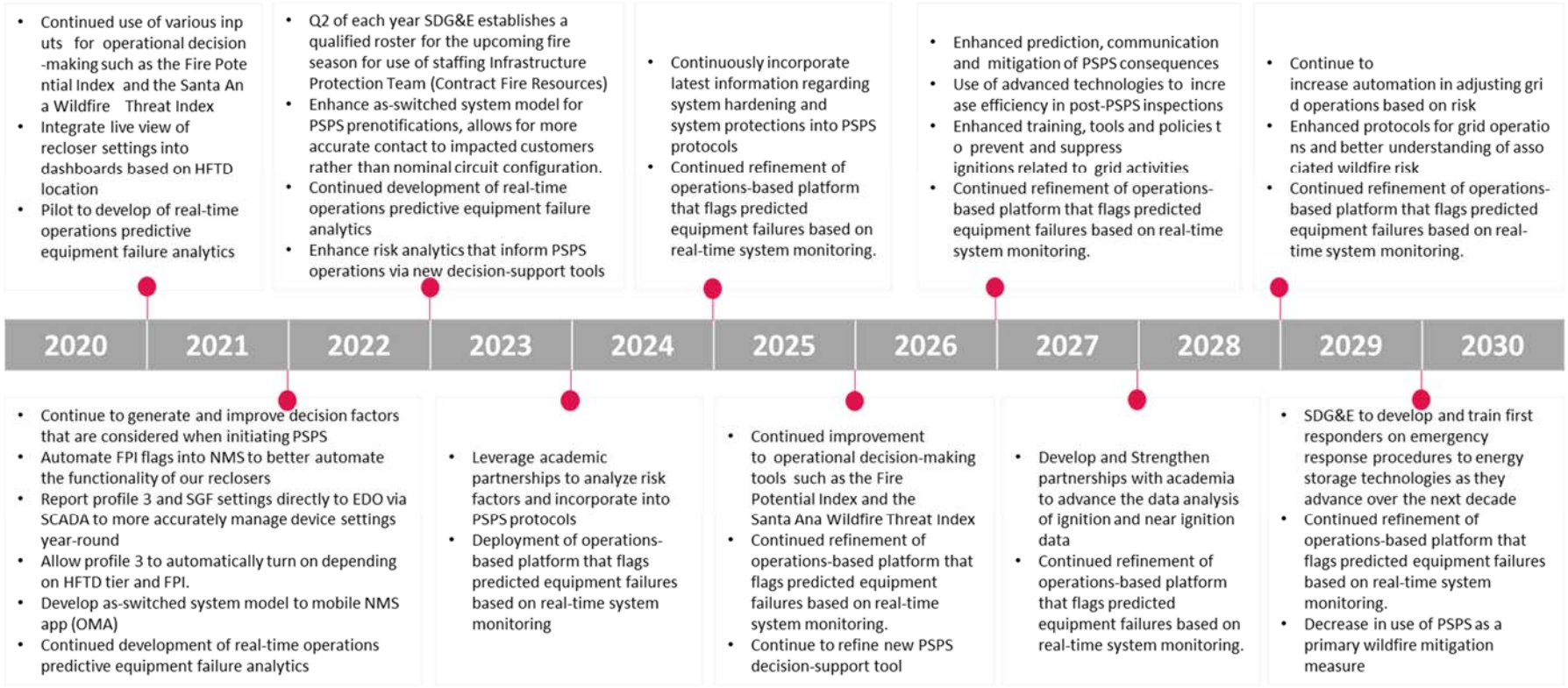
In 2020 SDG&E began an expansion of its use of LiDAR on transmission to a pilot initiative on its distribution system to determine the functional use of the technology and the potential for integration into its routine operations. SDG&E has begun the expansion of its workforce for

WMP implementation with the addition of internal staffing to perform inspection activities and to support PSPS operations.

Grid Operations and Protocols – State of Capabilities in 10 Years

As SDG&E continues to mature its grid operations capabilities, it will focus on increasing automation in grid operations based on risk, enhance protocols to decrease the use of PSPS over time, enhance prediction, communication and mitigation of PSPS consequences as well as deploy advanced technologies to increase efficiency in post-PSPS restoration efforts. In addition, SDG&E will continue to enhance training, tools and policies to prevent and reduce the consequence of ignitions related to grid activities and will expand its public education campaigns to better inform AFN and LEP populations during emergencies. A year-by-year timeline of SDG&E's roadmap for maturing this category is provided below.

Guidance 12 Figure 9
Grid Operations and Protocols – Annual Timeline



Grid Operations and Protocols – List of Activities

1. Enhancements to Distribution Operating Procedures (DOPs) to adequately capture recloser automation practices through scripting and more strategic use of SCADA systems
2. Relay Settings Database enhancements to facilitate the automation of providing operations with recloser programming
3. Enhancements to outage management system to include HFTD polygons and Fire Potential Index for improved troubleshooting on emergency outages, automated reclosing and safety documents, and proactive cancellation of discretionary work (ESP 113.1)
4. Enhancements to outage management mobile application to include as-switched model and damage assessment functionality for PSPS
5. Utilize key partners and Community Based Organizations to amplify PSPS preparedness and notification messaging and reach hard-to-reach customers.
6. Expanded public education and communication tools before and during events
7. Develop and pilot new tool with advanced risk analytics to support PSPS decision-making with the goal of enhancing targeting of PSPS operations to minimize impacts to customers

Grid Operations and Protocols – 2020 WMP

Within the category of Grid Operations and Protocols, SDG&E's three-year WMP is aimed at accomplishing milestones to meet our ten-year goal of maximizing capabilities with respect to operations technology, risk-based decision making, accurate event forecasting, and policies around preventing and suppressing fire ignitions. These milestones include the following:

- Recloser Protocols will be significantly enhanced through the development of more efficient automated processes in lieu of the less efficient and maintenance-intensive manual processes which exist today. These enhancements include improved situational awareness dashboards to easily verify how reclosers are set from a systemwide viewpoint, real-time settings change management, and dynamic recloser sensitivity adjustment and will enable the operations teams to react faster to changing climate conditions.

- Protocols to reduce the impacts of PSPS will be improved through the enhancement of operations technology. The as-switched model of Network Management System (NMS)will be ported over to the PSPS dashboard for more refined customer pre-notifications. Currently, the PSPS dashboard more closely ties to the as-built condition of our electric transmission and distribution system with respect to infrastructure and customer meter counts. This means any abnormal configuration present on the system will not be directly reflected in customer meter counts on the PSPS dashboard, so it is currently up to our electric operations experts to reconcile these customer meter counts to get notifications sent out correctly. Automating the as-switched model, which

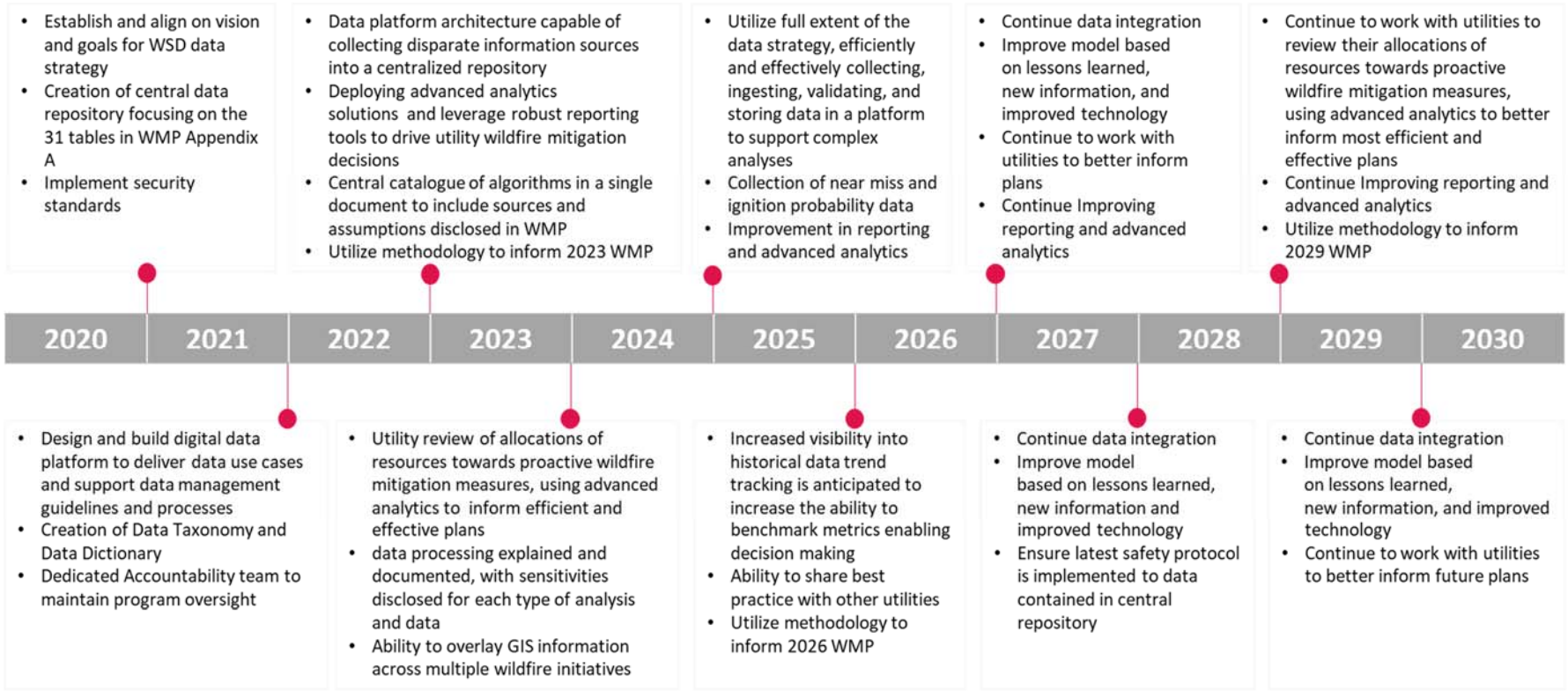
accounts for abnormal circuit conditions, into the PSPS dashboard will significantly expedite the customer notification process and make better use of internal resources to prep for extreme weather events. The as-switched model will also be rolled out to SDG&E's mobile NMS app to improve situational awareness for field personnel.

- Protocols for PSPS re-energization will be enhanced to reduce the restoration timeframes for customers once electric infrastructure is cleared for patrol. To expedite the operations center's capabilities for managing the re-energization process, SDG&E's enterprise NMS is being enhanced to include the pre-requisite checklists to verify patrols are complete, contracted fire resources are on-scene, and that the appropriate approvals have been given to allow for re-energization. Helicopter and ground patrols are also being reorganized to follow known routes to flexibly and safely patrol our lines as quickly as possible. SDG&E is increasing the availability of Unmanned Aerial Systems (UAS) to patrol lines that are both difficult to reach from the ground and difficult to see from helicopters while also focusing on long term investments in this technology to make it more efficient and safer to operate.
- The Aviation Firefighting program will enhance our stationed on-call ignition prevention and suppression resources and services. A key contributor to this enhancement will be the incorporation of a Sikorsky S-70M Firehawk into full operation to augment air resource capabilities.
- The Industrial Fire Brigade will complete its emergency pre-plans for critical electric substations, along with continuing research, development, and implement training for local fire departments on emergency response procedures for energy storage resources located within the HFTD.
- Coordination of contract fire resources will be enhanced for support during extreme weather events. These enhancements include formalizing the process of documenting qualified firefighter (QFF) requirements, continuing to strengthen the coordination with local, state, and federal fire agencies, and building up a yearly cadence in updating our available contract resources which can response during contractual periods and extreme weather events.
- SDG&E will continue to coordinate and form partnerships with local, state, and federal agencies to support the development of effective strategies and tactics to reduce the impacts of extreme weather events to our communities. This includes building on operations technology enhancements to provide advanced notification to critical customers and government agencies ahead of PSPS de-energizations, expanding public education on Medical Baseline enrollments, engaging customers on PSPS communication and notification practices, and always conducting after-action event review to understand how we can improve in the future.

Data Governance – State of Capabilities in 10 Years

Over the next ten years, SDG&E plans to build out its data and analytics capabilities by establishing a data governance framework to guide all its wildfire-related analytics. By 2030, SDG&E expects to enhance its analytics capabilities by continuing to integrate various data points into its wildfire mitigation data warehouse, enable real-time reporting, establish advanced sharing capabilities, enhance tracking of near-misses and increase its role in utility-ignited wildfires research. A year-by-year timeline of SDG&E's roadmap for maturing this category is provided below.

Guidance 12 Figure 10
Data Governance – Annual Timeline



Data Governance – List of Activities

1. Creation of data strategy in alignment with WSD strategic data vision
2. Build central data repository to house all required metrics specific to SDG&E's WM efforts
3. Document Process and Procedures cataloging data sources and assumptions, to include analysis and algorithms across relative to WM Business Units 3
4. Creation Master Data Governance Plan that encompasses all BU Data activity once centralized in data repository
5. Pilot improvements to verify and validate model with third-party experts
6. Build data integration capabilities to enable more real-time data updates
7. System capable of sharing across tiered level of permissions with embedded security protocol
8. Establish ability to data share within the research community and other utilities to leverage best practices in situational and operational research in California and beyond
9. Utilize data to optimize across categories of mitigations to justify risk spend efficiencies

Data Governance – 2020 WMP

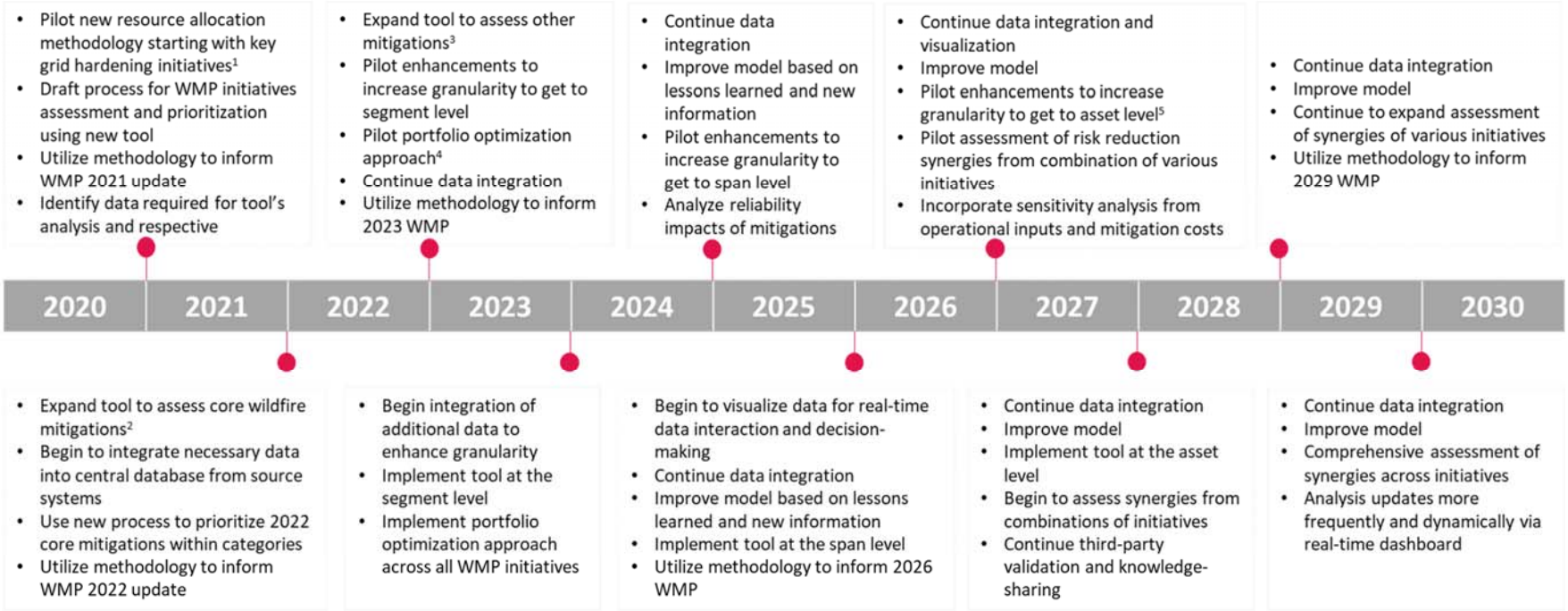
SDG&E's 2020 WMP includes the creation of a comprehensive data strategy and data governance plan to achieve the Company's 10-year goal to combine and cross reference data sources and align processes across business units with associated programs that support the wildfire mitigation effort. As described in the 2020WMP, development of an Enterprise Asset Management Platform (EAMP) will enable SDG&E to predict and assign asset health indexes (AHI) on its critical electric assets to identify and compare assets based on its likelihood for failure. Integrating this asset risk information with other inputs, such as circuit risk index for situational awareness, will inform the appropriate asset-related operational decision-making and strategy for enhanced reliability and safe operation of assets. SDG&E believes this will provide a means to optimize the risk, performance, and investments, while meeting or exceeding safety and regulatory objectives.

Resource Allocation Methodology – State of Capabilities in 10 Years

Over the next ten years, SDG&E will continue to enhance its approach to resource allocation for risk-based decision-making. As data becomes more available and integrated across systems, SDG&E plans to increase the granularity of its RSE calculations, moving from a system-level assessment to an asset-level assessment with flexibility to aggregate and disaggregate assets for various modeling applications. This visibility will enable real-time scenario and sensitivity analyses for mature risk-based decision-making. By 2030, SDG&E expects to enable real-time updates of RSEs as new projects and programs are implemented and enhance its ability to

conduct risk-based portfolio-wide optimizations across its various wildfire mitigation programs. Knowledge-sharing will continue to be a cornerstone of our approach as SDG&E validates and reviews advances with peer utilities and external parties. A year-by-year timeline of SDG&E's roadmap for maturing this category is provided below.

Guidance 12 Figure 11
Resource Allocation Methodology – Annual Timeline



1 Key grid hardening initiatives include covered conductor, undergrounding and traditional hardening
2 Core wildfire mitigations include major programs such as grid hardening, asset management and vegetation management
3 Other mitigations include situational awareness tools, operating protocols and other activities that support core mitigations
4 Portfolio optimization approach refers to the ability to optimize spend across various programs such as hardening vs vegetation management, etc.
5 Increasing granularity to get to the asset level will begin earlier in the timeline but may not be fully implemented until a later stage as new asset information and analytics capabilities mature over time

Resource Allocation Methodology – List of Activities

1. Develop a model that includes an assessment of both wildfire risk as well as risks of mitigations such as PSPS
2. Update Multi-Attribute Value Function to fit evolving needs to assess additional risks such as quantifying impacts of PSPS
3. Pilot improvements to verify and validate model with third-party experts
4. Build data integration capabilities to enable more real-time updates
5. Utilize model to assess alternatives and inform selection of mitigations
6. Utilize model to prioritize mitigation implementation within categories such as prioritizing hardening work and vegetation management work
7. Analyze effect of portfolio mitigations on reliability
8. Utilize model to optimize across categories of mitigations based on risk spend efficiencies
9. Incorporate sensitivity analysis from operational inputs and mitigation costs
10. Continuously and incrementally enhance data gathering capabilities to achieve increasing levels of granularity in models (gradually move from system-level to circuit-level, span-level and ultimately to asset-level assessments)
11. Establish a formalized process for evaluating wildfire mitigation initiatives and informing priorities on an annual or more frequent basis

Resource Allocation Methodology – 2020 WMP

SDG&E's 2020 WMP includes initiatives critical to achieving the Company's 10-year plan for building a robust resource allocation methodology. As described in the filing, SDG&E's Asset Management team has been working on developing a resource allocation tool. In addition to that, SDG&E's wildfire mitigation department has built on the efforts of the asset management organization to develop a tool specific to the wildfire mitigation program to align with the maturity model laid out by the Wildfire Safety Division. In addition to the specific initiatives discussed in the Resource Allocation methodology category, other initiatives such as the centralization of data, the improvement of asset analytics, situational awareness tools as well as PSPS mitigation engineering are all supporting the improvement of SDG&E's resource allocation methodologies as they provide critical data points and key considerations to incorporate in the decision-making framework.

Emergency Planning and Preparedness – State of Capabilities in 10 Years

Emergency Planning and Preparedness is an area that involves an extensive amount of coordination, both internally and externally. SDG&E's mission is to safeguard the public protecting lives, property and assets, while encouraging proper use of our resources. The Company plans on focusing and engaging the best industry practices to successfully fulfill our mission.

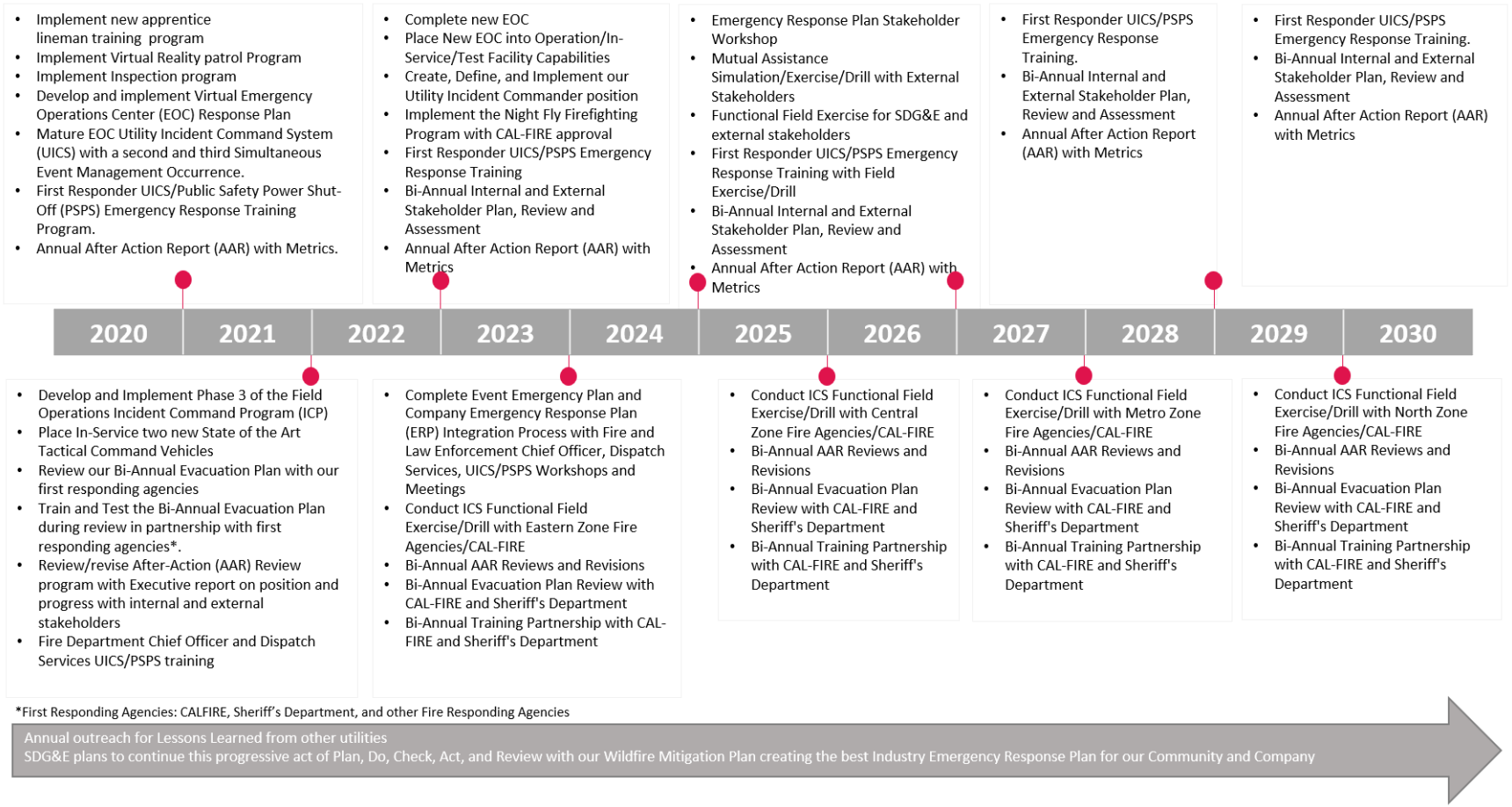
SDG&E continues to build a coordinated National Incident Management System (NIMS) Incident Command System (ICS) framework, accessing resources and knowledge across our region in our planning and response efforts. This framework focuses on SDG&E's engagement with stockholders, as well as building a knowledge-structure foundation with our customers, utility companies, CAL FIRE, and other local, state, and federal resources. Through these efforts, SDG&E will gather experiences shared by both community and regulatory partners to ensure improvements to our Wildfire Emergency Response Plan are implemented.

SDG&E' seeks to increase stakeholder engagement. SDG&E plans to use simulations to stress-test its Wildfire Emergency Response Plan, while increasing granularity and customization from lessons-learned. SDG&E will continue to focus on enhancing customer communication with focus on reaching its vulnerable populations before and during emergencies, to ensure family safety, preservation of homes and businesses, by sharing knowledge and preparation to potential hazards leading to wildfires.

SDG&E seeks to build and strengthen our partnership with outreach programs with local and regional governments. If local communities are well educated and knowledgeable of the hazards and risks of wildfires, it will increase public confidence. This process will include developing procedures and processes which engage the community with SDG&E, while benchmarking new and evolving industry practices with our customers and fellow community leaders.

SDG&E has created an annual timeline representing goals in a roadmap to our progressive goals for Emergency Preparedness and Response wildfire concerns, which includes engaging our stakeholders and employees towards mutual capabilities. This Wildfire Emergency Response Plan is designed to mitigate the territory in order to limit the occurrence of wildfires, and if they occur, our plan to protect lives and lessen any property/asset loss, then increase response times in restoring power to customers. It will also provide knowledge to other utility companies in effectively and successfully planning for wildfires, recognizing planning, preparedness, incident control measures, preservation methods, and recovery efforts.

Guidance 12 Figure 12
Emergency Planning and Preparedness – Annual Timeline



Emergency Planning and Preparedness – List of Activities

1. SDG&E's mission is to provide continued collaboration with government and community-based partners to evolve our opportunities for year-after-year improvements to our customers and community in education, outreach and coordination
2. SDG&E will build-out and engage in Resource Coordination through methods of benchmarking, changing and advancing processes and current and new technology which can be implemented to ensure proper and effective use of mitigation and response resources and assets.
3. SDG&E will continue expanding public education to all customers, especially to those identified as AFN and limited English proficiency (LEP) populations. SDG&E's goal is to reach everyone within our region.
4. SDG&E plans to ensure continued staff development and succession planning to be industry leaders in wildfire mitigation planning, preparedness, response, and recovery.

Emergency Planning and Preparedness – 2020 WMP

At the core of SDG&E's 2020 WMP for emergency planning and preparedness is collaboration with key internal and external stakeholders, as well as lessons learned from past incidents, trainings and exercises. Collaboration with external stakeholders is essential, as County and other local government agencies and Community Based Organizations are primarily responsible for emergency planning across the region. While SDG&E has strong existing relationships with many of these agencies, continuing to improve education, outreach and coordination today, can result in expanded information and resource sharing in the future.

SDG&E plans to use the information gathered to aid in review and revisions of its current WMP. SDG&E will engage with other industries, community, and volunteer agencies, to train together, learn from each other, and adapt to these experiences.

Stakeholder Cooperation and Community Engagement – State of Capabilities in 10 Years

As described above in Emergency Planning and Preparedness, stakeholder cooperation and community engagement are at the core of SDG&E's WMP. For more than a decade, SDG&E has continuously invested in building partnerships with community organizations, in order to strengthen overall community preparedness, response and resiliency.

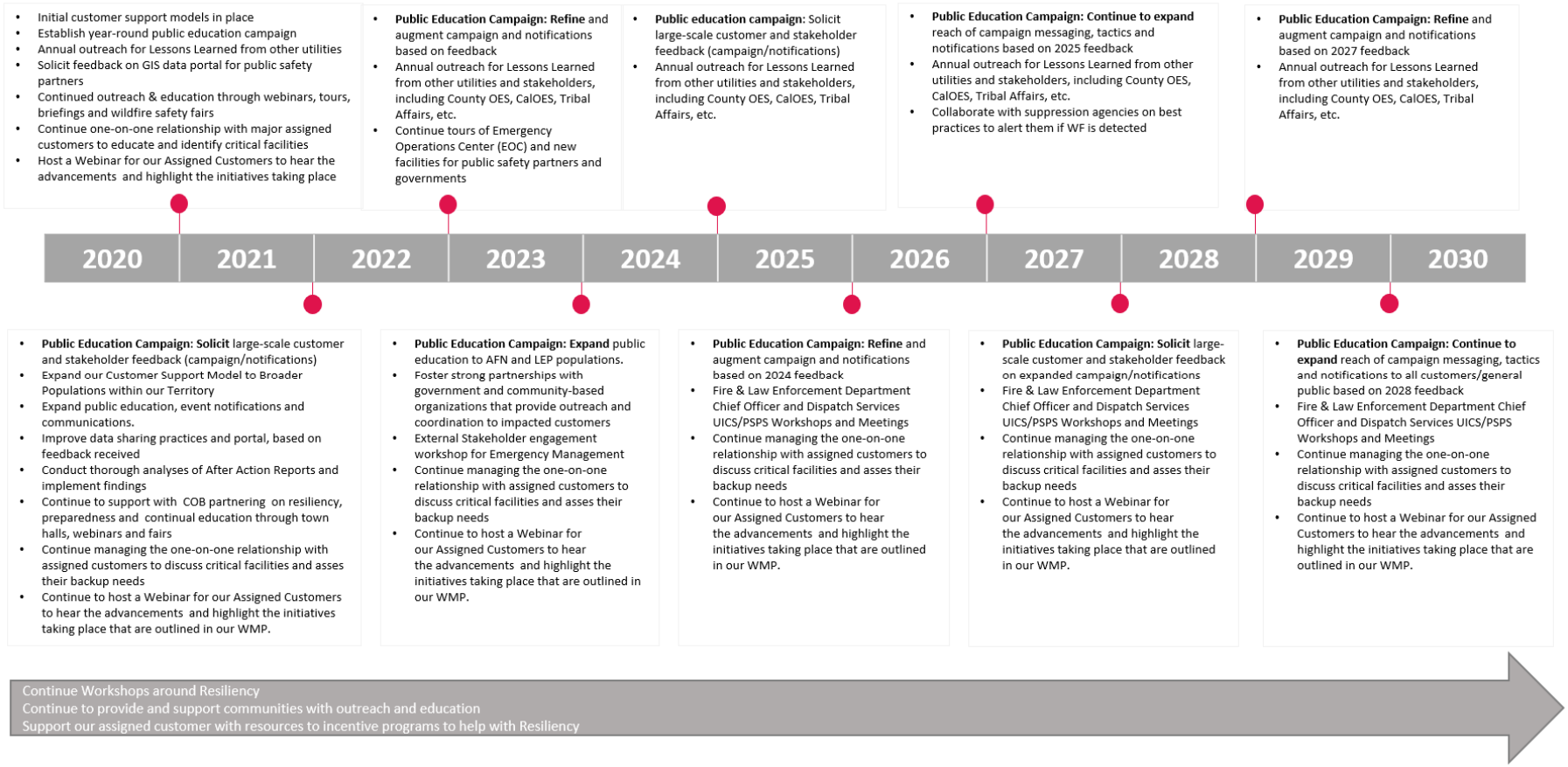
SDG&E has actively solicited feedback from our customers, local public agencies and other stakeholders through town hall community meetings, open houses, community fairs and one-on-one- meetings to refine and improve its wildfire and PSPS operational protocols, public outreach, communications and coordination. Those efforts will continue over the next ten years. SDG&E has significant existing collaborative partnerships with its local governments, regional partners and Community Based Organizations, which it will continue to build upon over the next decade to further strengthen resilience and preparedness in our region.

As SDG&E looks out to its ten-year vision on stakeholder cooperation and community engagement, its primary goal will be to reach 95-100% of the territory population with a focus on AFN and LEP customers. It is essential that there is breadth and depth of communications and outreach, and that SDG&E has a diverse set of measures that reach audiences in a meaningful way. Equally important is being purposeful in soliciting continuous feedback to refine, adapt and enhance the measures being utilized, especially with more vulnerable AFN and LEP customers.

Additionally, SDG&E's efforts will focus on formalizing processes to learn from peers in and outside of California, and will continue to expand community relationships and enhance partnerships. This process will broaden our engagement and planning efforts with emergency and non-emergency planning agencies as well as manage and direct comprehensive communication campaigns to our communities. Using support from community-based organizations and their emergency management and preparedness efforts, SDG&E will advance wildfire mitigation over the next few years.

SDG&E's roadmap has identified steps over the next ten years to be implemented for stakeholder cooperation and furthering community engagement with customers and first responders.

Guidance 12 Figure 13
Stakeholder Cooperation and Community Engagement – Annual Timeline



Stakeholder Cooperation and Community Engagement – List of Activities

1. Building off previous town hall events, in 2020 SDG&E held four Wildfire & Resiliency Webinar Events. During these live, interactive events, SDG&E identified knowledge gaps and educates stakeholders and customers on various topics regarding PSPS. SDG&E shared knowledge on public safety, planning and best practices for home and work preparedness for wildfire safety, technology and situational awareness, vegetation management, emergency preparedness, and overall wildfire resilience with over 500 attendees.

2. In 2020, SDG&E held its second annual Wildfire Safety Fair events, designed to bring communities together and connect them with resources. These events engage the community and promote SDG&E departments and community partners (i.e., 2-1-1, CAL FIRE, Feeding San Diego, American Red Cross, Fire Safety Councils, First Responders, plus many other volunteer agencies; local, state, and federal entities). To date in 2020, SDG&E has held three drive-thru fairs, with over 1,200 attendees, with two more events slated for September.

3. This year, SDG&E continued its annual education and outreach to our local jurisdictions, including tribal governments, public safety partners and agency partners and offered PSPS webinars, virtual Emergency Operations Center tours and individual briefings.

4. SDG&E will identify and create support models for customers, particularly those vulnerable populations (AFN). During PSPS events, key community partners (2-1-1 San Diego, 2-1-1 Orange County, and Indian Health Councils) are invited to aid and assist in these events.

5. SDG&E will create and engage in regional and statewide working groups and advisory councils to identify and understand the needs of customers during PSPS events. SDG&E will also identify potential solutions to best aid and respond to customer needs – immediate and future. This information will assist AFN support models and enable organizations such as 2-1-1 to serve as resource hubs for vulnerable customers who may need support or service like transportation, food security or health and welfare checks during PSPS events. These are well known organizations that have relationships with hundreds of community base organizations that can meet the needs of vulnerable customers. The agreements that have been established with these organizations include communications and outreach to vulnerable populations, especially in advance of PSPS events. SDG&E believes this regional model that links SDG&E customers with experts who serve vulnerable populations every day is a foundation to build upon over the next ten years.

6. SDG&E is actively engaged on AFN policy issues through a variety of forums, providing leadership at statewide and regional levels. This area of focus will continue to be developed and matured over the course of the next ten years. SDG&E has formed a

Wildfire Safety Community Advisory Council with a group of diverse local leaders from public safety, tribal government, business, nonprofit, telecommunications, public health and academia. The council provides feedback and recommendations on how SDG&E can continue to help protect the region from wildfires. This advisory council will likely continue to expand over the next ten years to include representation from additional stakeholder groups as they are identified. SDG&E has also helped form a PSPS Working Group, which is a new sub-committee of the existing County AFN Working Group. The purpose of this group is to focus on more regionalized issues. The Working Group will share lessons-learned to help us refine our wildfire and PSPS protocols. Participants include, but not limited to, critical customers such as water agencies and telecommunications providers, tribal nations, local governments, public safety partners, municipal utilities and community choice providers, and others. Over the next ten years, SDG&E will also grow and mature this working group and incorporate wildfire and PSPS lessons learned into its future protocols and contingency planning.

7. SDG&E will expand public education campaign and direct communications to target both AFN and LEP populations. This will involve Identifying and creating additional support materials and messaging to our community-based organizations, their constituents, and the media. It will also include soliciting customers, community-based organizations and stakeholder feedback each year to improve our overall SDG&E's internal and external communications.

SDG&E's commitment to the safety of the communities it serves is unwavering. Over the next ten years, SDG&E will continue to strive every day for continuous improvement. SDG&E will continue to work with customers, community leaders and community partners to help identify and implement the right solutions to adequately address wildfire risk and minimize PSPS. Continuous improvement is a hallmark of SDG&E's company culture.

Stakeholder Cooperation and Community Engagement – 2020 WMP

SDG&E's goal is to create an environment where its internal and external stakeholders can network and provide each other the necessary knowledge and expertise to engage each other through these tragedies, when wildfires strike our territory, region or state.

United with our community members and leaders, other service providers and first responders—SDG&E plans to create and implement the best wildfire resiliency training. SDG&E aims to gather and share relevant and pertinent information to all stakeholders.

Building upon the relationships SDG&E has built over time with regional stakeholders and the community, SDG&E was able to quickly adapt in 2020 in the face of a global pandemic and continue to educate and outreach with stakeholders and customers, transitioning from in person events to virtual and drive-thru events. Education and outreach will remain pivotal in the next decade as improvements and enhancements are made to SDG&E's infrastructure,

communications and technology. Communication with stakeholders and customers is an important element in helping them prepare them for a PSPS.

III. Resolution WSD-005 – SDG&E Deficiencies

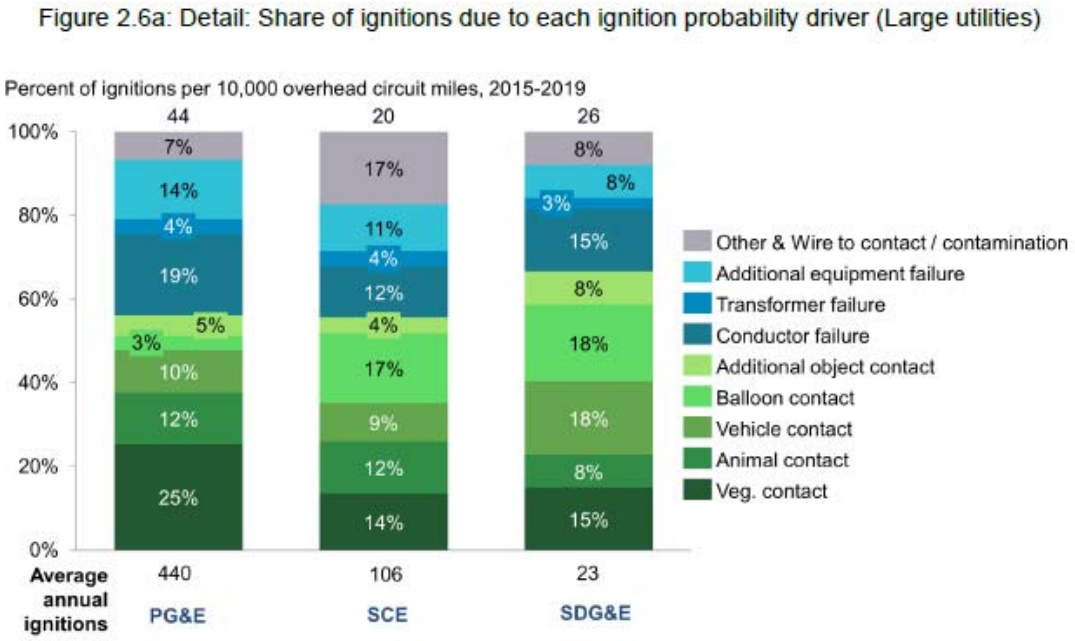
A. Condition SDGE-1: SDG&E Reports a High Number of Ignitions Related to Balloon Contact

In its first quarterly report, SDG&E shall:

i. *list and describe the actions it is taking to study the occurrence and potential consequence of metallic balloon caused ignitions in its service territory;*
ii. *efforts it is taking to mitigate the occurrence of such ignitions in the future;*
iii. *the status of the action and efforts identified in (i) and (ii) above, including timelines for completion;*
iv. *the specific initiatives in its 2020 WMP that aim to reduce the risk of balloon caused ignitions; and*
v. *its goals, targets and quantitative measures for evaluating effectiveness of the initiatives identified in (iv) at reducing the risk of balloon caused ignitions.*

The WSD asserts that SDG&E reports a higher number of ignitions due to balloon contacts than the other utilities, based on the % of ignitions by driver chart on page B28 of Resolution WSD-005, Appendix B, which is reproduced in the figure below.

SDGE-1 Figure 14
Share of Ignitions Due to Ignition Probability Driver – Large Utilities



Based on the figure above, SDG&E's ignitions due to balloon contacts are the highest of three utilities, representing 18% of ignitions relative to 17% of Edison's ignitions and just 3% of PG&E's ignitions. Resolution WSD-005 encouraged SDG&E to perform further analysis to better understand SDG&E's performance in this metric relative to other utilities. This analysis not only looks at the balloon ignitions relative to total ignitions but also examines the rate of ignitions per 1,000 miles for the three large utilities.

Balloon contacts are customer driven contacts and are not a result of equipment failure, a lack of maintenance, high winds, animal contacts or vegetation contacts. More specifically, balloon contacts result from customers releasing conductive metallic foil balloons into the air ("foil" balloons, and often referred to as Mylar® balloons). Given that, another normalization factor to consider is population density, as one would expect more balloon contacts from a utility that contained more customers per overhead circuit mile.

Balloon Contact Study

SDG&E performed an analysis for balloon contacts, the results of which are summarized in the table below. The full analysis is provided in Appendix E.

SDGE-1 Table 15
Summary of Balloon Ignition Drivers

Performance Metrics	5-year averages		
	SDG&E	PG&E	SCE
Balloon Contacts (T&D totals from WMP Table 11)	115.8	587.8	954.2
Balloon Contacts per 1,000 circuit miles	14.0	5.9	18.2
Balloon Contacts per 1,000 circuit miles per OH customer density	0.06	0.04	0.10
Balloon Ignitions (T&D totals from WMP Table 11)	4.2	15.0	17.8
Balloon Ignitions per 1,000 OH circuit miles	0.51	0.15	0.34
Balloon Ignitions per 1,000 circuit miles per OH customer density	0.0023	0.0011	0.0019
Percentage of total ignitions caused by balloons	18%	3%	17%

As the analysis shows, SDG&E's normalized rates are very similar to SCE's performance in this area, with SDG&E having fewer balloon contacts, but a higher percentage of those contacts leading to ignitions. And both SCE and SDG&E have ignitions occur at nearly double the rate of PG&E for this cause on a normalized basis.

In addition, if SDG&E examines balloon contacts by circuit miles broken down by the HFTD, the data shows the majority of contacts occur outside the HFTD, where population density is greater.

SDGE-1 Table 16
Summary of Balloon Ignition Location

Balloon Contacts per 1,000 circuit miles	
Non HFTD	28.7
Tier 2	2.9
Tier3	2.9

Mitigation of Ignitions Related to Balloon Contacts

SDG&E follows the same procedures for balloon contacts as it does for all outages. When an outage occurs, SDG&E sends first responders to ensure the area is first made safe. SDG&E then performs as many customer restorations as possible through switching, circuit segmentation and topology. When the location of a fault is found, the cause is identified and reported to system operators who log the cause code in SDG&E'S NMS. This data is periodically migrated to SDG&E's reliability database where it can be aggregated and reported.

If the outage was also responsible for an ignition, SDG&E's fire experts are notified and respond to work with firefighters to determine the cause of the ignition, the size of the fire, if it meets the criteria for a CPUC reportable ignition, and to log all relevant information in the ignition database. While that standard information remains the same, SDG&E always studies reliability issues and trends, and metallic foil balloon contacts have been one of the main causes of overhead faults for years.

Efforts to Mitigate Ignitions Related to Balloon Contacts

SDG&E has taken several efforts to mitigate the occurrence of balloon-caused ignitions. Efforts to mitigate the occurrence of such ignitions include:

a. Public awareness campaigns using social media and digital impressions about the risks metallic foil balloons pose to electric lines. Examples of this are provided below:

AD BY SAN DIEGO GAS & ELECTRIC

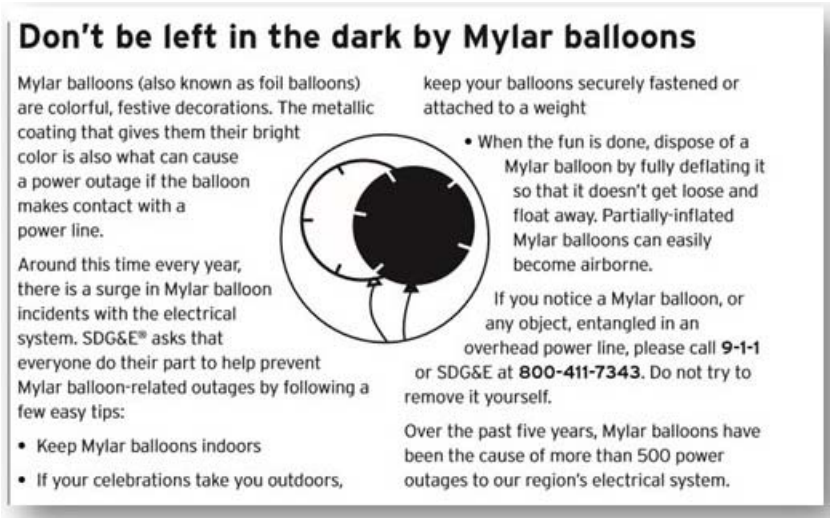
Don't let mylar balloons stop the party

Festivities taking you outdoors? Do your best to keep mylar balloons securely fastened and away from power lines.

Graduations and birthdays have transformed into drive-by celebrations complete with colorful parades, signs and shiny Mylar balloons. Unfortunately, if metallic balloons are not secured properly, they can cause a power outage if they make contact with power lines. Over the past week, we've responded to seven Mylar balloon related outages, impacting about 3,800 customers. Over the past five years, these balloons have been the cause of more 500 power outages in our region. 🎈Learn more on how to celebrate while staying safe at http://ow.ly/Xvpf50zKT0Y.

The only sparks flying this Valentine's Day should be between you and your partner, not the ones caused by loose Mylar balloons. 🎈Did you know that the shiny metallic coating that makes Mylar balloons so lovable can cause an outage if they come in contact with power lines? Here are some safety tips to keep close to your heart this Valentine's Day ➡ http://ow.ly/OY6i50ylUfm

b. Public awareness using bill inserts, typically the last page in a customer's bill, was featured in customers' April 2020 bills.



Don't be left in the dark by Mylar balloons

Mylar balloons (also known as foil balloons) are colorful, festive decorations. The metallic coating that gives them their bright color is also what can cause a power outage if the balloon makes contact with a power line.

Around this time every year, there is a surge in Mylar balloon incidents with the electrical system. SDG&E® asks that everyone do their part to help prevent Mylar balloon-related outages by following a few easy tips:

- Keep Mylar balloons indoors
- If your celebrations take you outdoors, keep your balloons securely fastened or attached to a weight
- When the fun is done, dispose of a Mylar balloon by fully deflating it so that it doesn't get loose and float away. Partially-inflated Mylar balloons can easily become airborne.

If you notice a Mylar balloon, or any object, entangled in an overhead power line, please call **9-1-1** or SDG&E at **800-411-7343**. Do not try to remove it yourself.

Over the past five years, Mylar balloons have been the cause of more than 500 power outages to our region's electrical system.

c. Public awareness using TV and over-the-top (online) spots to inform customers about electrical safety with foil balloons.

d. Developing and testing a non-conductive foil balloon prototype through an agreement with a major balloon manufacturer. This balloon material looks like a regular foil balloon, but has been tested to not flash over and cause faults (and potential ignitions) when the non-conductive balloon makes contact with overhead electric power lines. SDG&E and the balloon manufacturer have been using a national electrical test agency NEETRAC (National Electric Energy Testing, Research and Applications Center) to conduct independent tests on the prototypes balloons at electric distribution voltages under grid-like conditions.

e. Participating in the Institute of Electrical and Electronics Engineers (IEEE) Power and Energy Society (PES) Distribution Reliability Working Group (DRWG) to develop an

industry standard for testing the dielectric performance of celebratory balloons in contact with overhead distribution lines. This standard may act as a safety benchmark test for balloon manufacturers to meet in order to provide products that will not react undesirably with overhead electric power lines.

f. Publishing industry articles on the progress of SDG&E's non-conductive foil balloon work, to raise awareness among electric utilities, regulators, and legislators that are seeking to address the problem. A recent publication of this effort was made in June 2020 in Transmission & Distribution World: http://ow.ly/sw9w50AVAUF.

Status of Actions/Efforts and Timelines for Completion

The traditional mitigations that SDG&E expects will reduce foil balloon contacts and ignitions and were a part of SDG&E's WMP include:

- Covered Conductor: SDG&E expects that covered conductor should reduce the chance of the phase to phase contact failure mode that occurs when a mylar balloon gets between two conductors.
- Strategic Undergrounding: The removal of overhead facilities eliminates the mylar balloon failure mode occurring.
- Profile 3 recloser settings: These settings reduce the fault energy generated by a mylar balloon contact, reducing the chance that an outage will lead to an ignition. These settings are only implemented during extreme FPI and RFW days, so this mitigation functions when risk is the highest and the need is most critical, but does not largely impact the overall ignitions occurring due to balloon contacts because most days during the year are not extreme FPI or RFW days.

The following summarizes the status and timelines of these programs:

- The social media and digital campaign is already in effect and an on-going effort.
- The bill inserts were completed in April 2020.

- TV and over-the-top spots ran for three weeks in English and Spanish in May and June 2020.
- SDG&E is negotiating a commercial agreement with the testing agency to perform the tests on the prototypes at distribution voltages up to 35kV. SDG&E expects to execute the agreement and conclude the testing before the end of Q4-2020. SDG&E completed tests on the prototype non-conductive balloons at 12 kV and 21 kV in 2019.
- IEEE approved the creation of a task force in the DRWG working group to develop a draft trial standard. The standard will take time to develop, and it may be adopted in 2023.
- The TD World article was published in June 2020.
- Covered Conductor work is updated quarterly in SDG&E's safety certification and update advice letter.
- Strategic Underground work is updated quarterly in SDG&E's safety certification and update advice letter.
- The profile 3 protection settings has been implemented and is fully operational.

2020 WMP Initiatives That Reduce Risk of Balloon-Caused Ignitions

These initiatives are listed above as covered conductor, strategic undergrounding, and profile 3 protection settings.

Evaluating Effectiveness of Initiatives

To measure the effectiveness of the traditional mitigations, SDG&E plans to measure the historical reliability performance of the lines that are being upgraded to covered conductor and strategic undergrounding before the upgrades were made. Once installed, SDG&E will measure the performance of the hardened lines in future years. SDG&E can then compare the number of balloon outages and ignitions that occurred before the hardening programs were completed to the number of balloon outages and ignitions that occurred after the covered conductor and undergrounding work was completed. SDG&E will normalize the data by time unhardened and time hardened to provide an apples-to-apples rate of contact/ignition comparison. Hardening initiatives will take a few years of operating to get samples large enough to be considered significant.

The goal of the 35kV tests at NEETRAC are to cover distribution voltages in use within California's overhead electric grid, including PG&E and SCE territory. The non-conductive balloons that SDG&E developed with a balloon manufacturer have already passed grid-condition tests at 12kV and 21kV. NEETRAC will determine if the non-conductive balloons can pass grid-condition tests at 35kV.

The goal of the IEEE standard is to provide the foil balloon industry a method for testing their products, with the ultimate goal of eliminating foil balloons that are unsafe for the overhead electric grid. The IEEE members and new standards committee will vote on the trial testing standard when the draft is completed. The quantitative measure of effectiveness for these long-term efforts will be the reduction in the number of balloon-caused ignitions and power outages across all electric distribution overhead lines.

B. Condition SDGE-2: SDG&E Reports a High Number of Ignitions Related to Vehicle Contact

In its first quarterly report, SDG&E shall:

i. *list and describe the actions it is taking to study the occurrence and potential consequence of vehicle contact caused ignitions in its service territory;*
ii. *efforts it is taking to mitigate the occurrence of such ignitions in the future;*
iii. *the status of the action and efforts identified in (i) and (ii) above, including timelines for completion;*
iv. *the specific initiatives in its 2020 WMP that aim to reduce the risk of vehicle contact caused ignitions; and*
v. *its goals, targets and quantitative measures for evaluating effectiveness of the initiatives identified in (iv) at reducing the risk of vehicle contact caused ignitions.*

The WSD asserts that SDG&E reports a higher number of ignitions due to vehicle contacts than the other utilities, based on the % of ignitions by driver chart on page B28 of Resolution WSD-005, Appendix B, which is reproduced in Section III.B above.

Based on SDGE-1 Figure 14 above, SDG&E's vehicle contacts are the highest of three utilities, representing 18% of ignitions relative to 9% of SCE's ignitions and 10% of PG&E's ignitions. As with balloons, this chart and the subsequent resolution encouraged SDG&E to perform further analysis to better understand SDG&E's performance in this metric relative to other utilities. This analysis would not only look at the vehicle ignitions relative to total ignitions but also look at the rate of ignitions per 1000 miles for the three utilities.

Vehicle contacts, like balloon contacts are customer driven contacts. Vehicles contacts are typically a result of human error that leads to a crash into a facility, which means this metric is adversely impacted by having a large population density, which SDG&E has relative to the other California electric utilities.

SDG&E performed an analysis for vehicle contacts, the results of which are summarized in the table below. The full analysis is provided in Appendix E.

SDGE-2 Table 17
Summary of Vehicle Ignition Drivers

Performance Metrics	5-year averages		
	SDG&E	PG&E	SCE
Vehicle Contacts (T&D totals from WMP Table 11)	212	1931.4	756.2
Vehicle Contacts per 1,000 circuit miles	25.5	19.5	14.5
Vehicle Contacts per 1,000 circuit miles per OH customer density	0.12	0.14	0.08
Vehicle Ignitions (T&D totals from WMP Table 11)	4	45	9.8
Vehicle Ignitions per 1,000 circuit miles	0.5	0.5	0.2
Vehicle Ignitions per 1,000 circuit miles per OH customer density	0.0022	0.0033	0.0011
Percentage of total ignitions caused by vehicles	18%	10%	9%

As the analysis shows, SDG&E's normalized rates are very similar to PG&E's performance in this area, with SDG&E having more vehicle contacts, but a lower percentage of those contacts leading to ignitions. When normalized against population density, SDG&E does not have the highest incident rate of vehicle ignitions per overhead customer density.

In addition, if SDG&E examines vehicle contacts by overhead circuit miles broken down by the HFTD, the data shows the majority of contacts occur outside the HFTD, where population density is greater.

SDGE-2 Table 18
Summary of Vehicle Ignition Locations

Vehicle Contacts Per 1,000 OH miles	
None HFTD	58.2
Tier 2	12.6
Tier 3	6.9

Mitigation of Ignitions Related to Vehicle Contacts

SDG&E follows the same procedures for vehicle contacts as it does for all outages. When an outage occurs, SDG&E sends first responders to ensure the area is first made safe. SDG&E then performs as many customer restorations as possible through switching, circuit segmentation and topology. When the location of a fault is found, the cause is identified and reported to system operators who log the cause code in SDG&E'S NMS. This data is periodically migrated to SDG&E's reliability database where it can be aggregated and reported. If the outage was also responsible for an ignition, SDG&E's fire experts are notified and respond to work with firefighters to determine the cause of the ignition, the size of the fire, if it meets the criteria for a CPUC reportable ignition, and to log all relevant information in the ignition database. While that standard information remains the same, SDG&E always studies reliability issues and trends, including outages caused by vehicle contacts.

Efforts to Mitigate Ignitions Related to Vehicle Contacts

In an effort to mitigate vehicle contacts, SDG&E examines whether vehicle contacts occur in close proximity to each other, vehicle contacts that occur on the same circuit, or sometimes have even hit the same pole twice. In these special cases, where SDG&E identifies a high-speed corner that increases the risk of vehicle contact, designs have been created to relocate structures to mitigate this risk. But these situations are not frequent occurrences. Most vehicle contacts appear to be random and are not easily attributed to a poorly located structure relative to traffic speeds in the area.

The mitigations included in SDG&E's 2020 WMP that SDG&E would expect to reduce vehicle contacts are as follows:

- Strategic Undergrounding: Removing overhead structures eliminates the chance of poles being struck by vehicles. Vehicle contacts still may occur on pad mounted equipment, but there is a lot less pad mounted equipment when compared to poles, and there have been very few ignitions associated with pad mounted vehicle contacts.
- Profile 3 recloser settings: These settings reduce the fault energy generated by wire slap or downed conductor that typically results from vehicle contacts, reducing the chance that an outage will lead to an ignition. These setting are only implemented during extreme FPI and RFW days, so this mitigation only functions when risk is the highest and the need is most critical, and does not largely impact the overall ignition numbers because most days during the year are not extreme FPI or RFW days.
- Steel poles on transmission and distribution system: As part of grid hardening, SDG&E has replaced wood poles with steel poles since 2008 on the transmission system and since 2013 on the distribution system. This has contributed to mitigating the impacts of vehicle contacts. Steel is a ductile material, meaning that it can experience large plastic deformation prior to failure. Wood is a less ductile material than steel. As a result, when wood is loaded past the yield point, it has less reserve strength than steel and structural failure is more immediate. Applying this to a pole to vehicle contact scenario, if a pole is struck by a vehicle resulting in damage to the pole, a wood pole would be more likely to collapse than a steel pole, which would then create arcing and heat generation nearer to the ground and vegetation fuels.

Status of Actions/Efforts and Timelines for Completion

The status of strategic undergrounding and overhead fire hardening (installation of steel pole structures) is updated quarterly in SDG&E's safety certification and WMP update advice letter. Profile 3 protection settings have been implemented and are fully operational.

2020 WMP Initiatives That Reduce Risk of Vehicle-Caused Ignitions

Please refer to the discussion of strategic undergrounding, profile 3 protection settings, and steel pole installations above.

Evaluating Effectiveness of Initiatives

To measure the effectiveness of the mitigations, SDG&E plans to measure the historical reliability performance of the lines that are being converted to underground before the upgrades were made. Once converted to underground, SDG&E will measure the performance of the hardened lines over the next couple of years. SDG&E can then compare the number of vehicle contacts and ignitions that occurred before the hardening programs were completed compared to the number of vehicle contacts and ignitions that occurred after the undergrounding work has been completed. SDG&E will normalize the data by time unhardened and time hardened to ensure an apples to apples rate of contact/ignition comparison. Hardening initiatives will take a few years of operating to get reliability data samples large enough to be considered significant.

C. Condition SDGE-3: SDG&E Fails to Explain How it Plans to Incorporate Lessons Learned Into Updates of its Risk Models

In its first quarterly report, SDG&E shall describe:

i. how it plans to incorporate learnings into its risk models, including a specific timeline for implementation;

ii. changes or updates to its risk models identified after 2020 WMP submission; and

iii. the status of implementing the changes and updates identified in (ii) above, including the expected timeframe for completion.

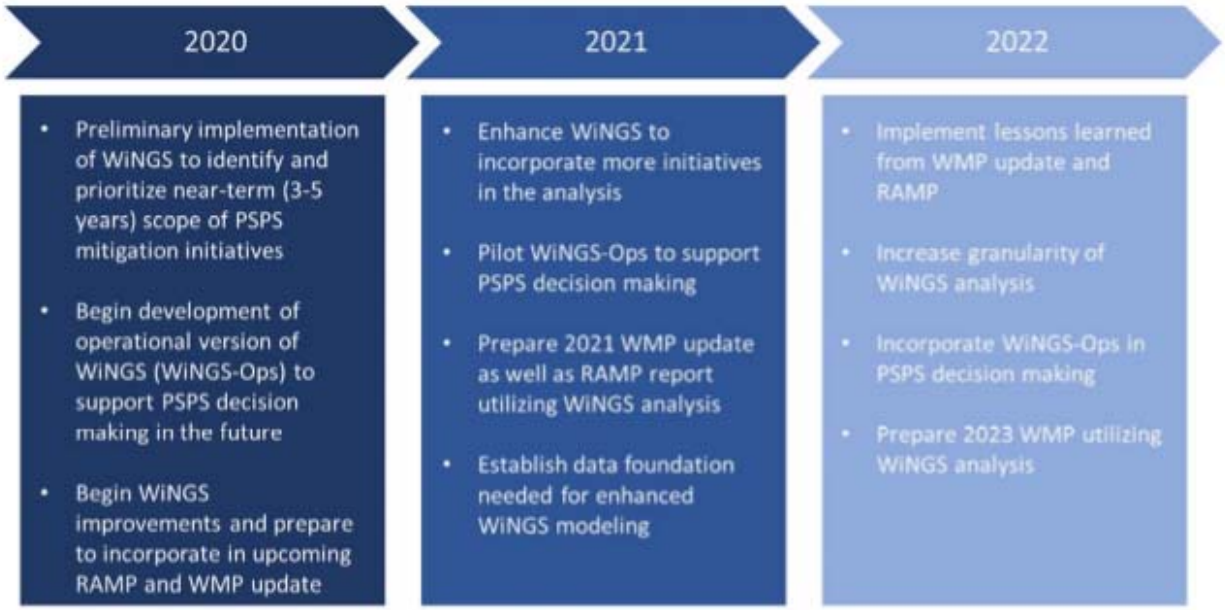
SDG&E continuously seeks opportunities to improve its risk modeling capabilities and to incorporate lessons learned. The key risk models that SDG&E utilizes to support wildfire decision-making include WRRM, WRRM-Ops and the MAVF developed in RAMP for calculation of RSEs to determine optimal mitigations and prioritization of those mitigations. SDG&E wildfire subject matter experts closely analyze historical wildfire activity and work with academia to enhance fire science and update key risk models with lessons learned.

Most recently, SDG&E has taken an initiative to incorporate lessons learned from the 2019 PSPS events to find ways to integrate PSPS risks into the decision-making framework. As a result, SDG&E developed a new model to quantify both the wildfire risk and the PSPS risk at a more granular level to guide investment decisions as well as operational decisions – the Wildfire Next Generation System (WiNGS).

As described in SDG&E's July 27, 2020 Remedial Compliance Plan[10] and supplemented by the response in this Report to Guidance 12 regarding long-term plans, SDG&E has developed a year-by-year timeline of how it plans to enhance its risk modeling capabilities and implement lessons learned in the future. The following timeline focuses on how SDG&E plans to enhance and implement its WiNGS model over time. At this time, SDG&E has developed a pilot version of the model that looks at system hardening initiatives on a segment-by-segment basis to determine optimal mitigations to implement in the future. As SDG&E's efforts to build this model continue, the plan is to begin integrating a version of it into operations to inform PSPS decisions and increase granularity of the model over time.

[10] Available at: https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/About_Us/Organization/Divisions/WSD/SDGE%20WMP%20Remedial%20Compliance%20Plan%2007-27-2020%20(R.18-10-007).pdf

SDGE-3 Figure 15
WiNGS Timeline



D. Condition SDGE-4: SDG&E Does Not Provide Sufficient Detail on Strategic Undergrounding Pilots

In its first quarterly report, SDG&E shall:

i. detail its plans to report and share the findings of its undergrounding pilot initiatives;
ii. outline what data it plans to collect and report for project scope, cost and schedule of these projects, and
iii. explain how it intends to track and measure the effectiveness of these projects in comparison to other WMP initiatives.

Findings of Undergrounding Pilot Initiatives

Due to the piloting nature of SDG&E's strategic undergrounding projects, there are currently uncertainties regarding project cost and schedule. In addition, the COVID-19 pandemic created new requirements and challenges for how SDG&E approaches customer and community communications. SDG&E plans to report annually on findings and challenges noted in this Report. To date, some of the findings and challenges encountered are as follows:

Engineering:

- Blue granite soil formation – when encountered, SDG&E had to hand dig the route area. This delayed construction and contributed to added cost.
- COVID-19 issues caused access restrictions to customer properties, fielding/surveys, and outage and energization constraints.

Permitting & Easements:

- Cleveland National Forest land crossings and permitting process varies project to project and can take up to 6-12 months.
- Tribal/Bureau of Indian Affairs (BIA) land crossings; There have been challenges with the line routes due to cultural resources, however, the Tribes in general have been supportive and very cooperative in helping remove challenges. SDG&E also had to go through its internal process and procedures, which takes additional time to acquire land easements and permits.
- The County of San Diego has supported SDG&E by helping expedite the permitting process for undergrounding fire-prone areas and critical facilities.
- Private, County, and Caltrans owned bridges permit acquisition duration varies depending on design requirements and the permitting agencies process and procedures.
- Challenges in attaining private easements from customers in order to finalize routes.

Environmental:

- Historical and Natural Resources concerns such highways and bridges.
- Cultural resources concern in tribal territories.

Public Affairs:

- The majority of customers support the undergrounding effort to reduce fire risk and PSPS impacts in the back country. But some customers remain skeptical because it is a new program and COVID-19 has altered how we communicate and perform community outreach to share information on the program and projects. Specifically, SDG&E is limiting in-person contact, and is making every effort to communicate via phone calls, mailing letters, and equipping our field survey crews with fact sheets and door hangers with information related to the projects/program to distribute to community residences and public areas. In addition, SDG&E is developing a website to provide customers with additional information. These outreach methods have shown that the community is interested to learn how they can be connected so that they remain energized during red flag events.
- Critical facilities that have been identified to be undergrounded such as schools, fire stations, and libraries are supportive and have volunteered to advocate for the project to the community.

Collection of Project Data

SDG&E's Strategic Undergrounding Program plans to collect data on cost, schedule, underground mileage, total number of customers (including critical facilities and community area) at locations benefitting from the projects, and the estimated overhead facilities exposure reductions to wildfire risk.

SDG&E's strategic undergrounding program has scoped out approximately 70 miles of underground projects, and 15 miles of which is slated to be constructed this year.

SDGE-4 Table 19
Strategic Undergrounding Program Projects

Year	Community	Circuit #	Project Description	# UG Miles	Customers/Critical Facilities
2020	Valley Center	C1021/C352	Lilac	**0.20**	Lilac School
2020	Valley Center	C1030	Phase 1 (Skyline Ranch)	**5.49**	1 master meter serving 225 mobile home customers (Elderly Community), 1 pump station, and approximate 215 existing underground customer meters
2020	Alpine	C1458	PH.1A W. Victoria Rd	**1.00**	Approx. 723 existing underground customer meters
2020	Julian	C221	Phase 1 (Cape Horn)	**0.40**	Julian Elementary School, Julian Charter School, Julian Union High School, 1 pump station, Friends of the Julian Library
2020	Julian	C221	Phase 2 (Banner Rd)	**0.87**	Post Office, Fire station, County Maintenance Yard, State of Cal Office, Bus Yard, Caltrans office
2020	Santa Ysabel	C221	DUG PH.2 (ST to Dudley's)	**0.54**	Bakery, Julian Pie, Market/ATM, Charging Station, Restaurants, Post Office, Other Commercial shops
2020	Alpine	C357	E. Victoria Rd	**1.00**	Padre Dam, 3 Communication sites, and residential community
2020	Jamul Tribe	C75	DUG to Jamul Tribe	**5.83**	Steele Canyon High School, San Diego County Fire Station 36, Jamul Casino
2020	City of Carlsbad	C754	Vallecitos	**0.30**	Vallecitos Water District Meadowlark Water Reclamation Facility

SDG&E began strategic undergrounding pilot projects in November 2019 in Julian and Carlsbad. These projects target critical and essential facilities for the communities. At Julian, SDG&E provides a generator during PSPS events for downtown Julian to keep the already underground businesses energized on Main Street. Other facilities adjacent to Main Street – a post office, library, CAL Fire and several schools cannot be supported by the generator because they are served from overhead circuits. This means that these critical facilities are without power if the area undergoes a PSPS during adverse weather conditions. By the third quarter of 2020, this project will be complete, and these facilities will be fed by a new underground circuit, with the goal of keeping this area energized during PSPS events.

Similarly, in Carlsbad, the Vallecitos Water District Meadowlark Water Reclamation Facility experiences PSPS events during high wind conditions because it is served from an overhead service line. This facility recycles and distributes water to the neighboring water agencies such as Olivenhain Municipal Water District and the City of Carlsbad. The strategic undergrounding program completed a new underground service line connection in May of 2020 that will keep the facility energized during future Santa Ana wind events.

Currently, the strategic undergrounding program has approximately 8 miles in construction and 2.1 miles are energized. The next community targeted for undergrounding is Valley Center. Four separate underground projects are in design: Skyline Ranch, Paradise Mountain, Hell Hole Canyon, and Valley Center Road. Construction of the Skyline Ranch project will start in August 2020, and the remaining projects will begin construction in the first quarter of 2021. When these projects are complete, more than 15 miles of circuits will be installed and converted to underground. These projects will enable approximately 600 customer accounts, a middle school, a fire station, sheriff's department, elderly community, and pump station to remain powered during PSPS events.

In relation to cost, the program has energized 2.1 miles to date, but these projects are still in the close out phase, which includes a quality audit of the construction and final invoicing. Because final invoicing has not been completed, SDGE cannot provide a cost per mile update in this quarterly report. By the end of 2020, 11 miles of underground work are scheduled to be energized and closed, and SDG&E expects to report the cost per mile expenses at that time as part of the February WMP update. With this data, SDG&E will update its risk models for all the core mitigations (bare conductor hardening, covered conductor hardening, and undergrounding) so that RSEs reflect the most accurate cost information.

To keep the cost per mile of strategic undergrounding as low as possible, SDG&E also evaluated and implemented cost saving strategies into the program. Examples of these cost savings are as follows:

- Bundling the engineering and design projects by proximity, when appropriate. This reduces the number of trips required and distance travelled by field survey crews.

- Developed new innovative SDG&E distribution undergrounding design standards for trenching that allows for efficient digging and compaction. This new design reduces costs where installation is feasible by reducing the depth and simplifying conduit configuration. This new design is being piloted on the C1030, C221 direct undergrounding (DUG) projects, and future projects where it is feasible.

- Conducting research and development on a new breakaway connection technology that breaks away from the pole when contacted by forces that exceed the design strength, causing a de-energized line to fall to the ground safely. This implementation will replace the need to underground from the existing service pole to the customer panel, providing additional cost savings.

- Refined the bidding strategy from a single approach of bundling electrical and civil engineering to allowing flexibility to bundle or separate electrical and civil packages. This approach has resulted in cost saving of approximately $5 million thus far.

Tracking and Measuring Effectiveness

When SDG&E used the term "pilot" for its strategic undergrounding project, that term was utilized to express the uncertainty in cost and schedule associated with performing underground conversions in rural areas, where SDG&E has little existing underground infrastructure today, and little experience performing the work in these areas. The purpose of the so-called pilot was to document cost per mile expenses and to note challenges or efficiencies learned from working in more rural areas. These challenges are noted above.

The effectiveness of undergrounding overhead power lines as a wildfire mitigation has never been in question. SDG&E's electric distribution system is 61% underground, and SDG&E has had underground facilities for over 40 years. Since SDG&E began tracking CPUC reportable ignitions, SDG&E only has 3 ignitions associated with pad mounted underground equipment, compared to 175 overhead ignitions (just 1.7% of all ignitions compared to a 61% underground system), all of which were caused by vehicle contacts.

An underground system is not impacted by high wind, and so underground fault rates have little correlation with the Santa Ana wind events that typically define SDG&E's extreme FPI days. The issue with undergrounding is not effectiveness. Rather it is cost. SDG&E's strategic undergrounding program has two separate goals. The first goal is to ensure critical community infrastructure can stay energized during PSPS events (*i.e.*, schools, grocery stores, gas stations and fire departments). By creating direct underground feeds to these community centers, customers can gather at their community centers and their children can still attend school, even though their individual residences may be de-energized. The second goal is wildfire risk reduction which is accomplished by converting overhead lines to underground lines.

E. Condition SDGE-5: SDG&E Does Not Provide Sufficient Detail on Need for Regulatory Assistance

In its first quarterly report, SDG&E shall:

i. list and describe all regulatory barriers to implementation of its undergrounding initiatives,

ii. detail its proposals for specific regulatory changes needed to eliminate the barriers identified in (i) above; and

iii. describe its efforts and actions over the past 3 years to collaborate with regulators and other entities responsible for implementing the regulatory changes identified in (ii) above, including status and expected timeline for implementation.

When SDG&E began its strategic undergrounding program, SDG&E sought to understand whether any tariff or other rules existed to define the customer interaction with converting an overhead service to an underground service on a utility-initiated program. The conversion of services is necessary, as SDG&E's goal with its strategic undergrounding conversion programs is to eliminate the risk of ignition from overhead infrastructure in the highest risk areas, not just at the primary voltages, but at the secondary voltages and services as well. The traditional conversion of an overhead service to an underground service typically involves electrician work to remove the weather head and modify the electrical panel to allow for an underground attachment. Any panel modification also requires a city inspection. Since overhead to underground conversions have historically been initiated by customers, developers, or cities, they paid for the majority of these conversion costs.

The strategic underground program is, however, utility-initiated, and the wildfire risk reduction benefits are shared by all customers in SDG&E's service territory. Thus, SDG&E wanted to reimburse the customer expenditures associated with this conversion, but wanted to avoid expenses unrelated to the conversion, such as customer panels not being up to county or city codes. After a review of SDG&E's electric tariffs, SDG&E has determined it may convert overhead services to underground and reimburse the customer expenses associated with the conversion. SDG&E has also taken several steps to reduce costs where the service panel is not already built to accommodate an underground service, developing methods to limit the scope of panel modifications.

SDG&E is thus proceeding with these overhead to underground service conversions and plans to reimburse the reasonable customer costs associated with the conversion since all customers benefit through reduced risk of wildfire in SDG&E's service territory.

F. Condition SDGE-6: SDG&E Does Not Provide Sufficient Detail on Plans for Reinforcing Transmission Lines

In its first quarterly report, SDG&E shall:

i. *detail how it plans to measure and report the efficacy of its plans to reinforce transmission lines and, specifically, to have at least one hardened line into every transmission substation in the HFTD by 2020 and to harden 66 miles within the three-year plan period;*
ii. *list and describe the specific actions and initiatives it plans to implement to achieve this plan for its transmission lines; and*
iii. *the status and timeline for completion of all actions and initiatives identified in (ii) above.*

Measuring and Reporting Efficacy

SDG&E has been hardening its transmission system since 2008. To demonstrate specifically, SDG&E provides a map in Confidential Appendix F showing its hardened transmission lines, and lines that are planned for hardening in 2020, 2021, and 2022. This map shows that all HFTD Tier 3 substations will have at least one hardened transmission line, significantly reducing the risk of wildfire in those areas and the risk of a substation level PSPS event.

Actions and Initiatives

SDG&E manages its transmission line hardening projects through a stage gate process including the following: project Initiation, preliminary engineering and design, final engineering and permitting, pre-construction, construction, and close out. Individual project progress and schedule status is tracked through a Primavera scheduling tool. SDG&E continues to take action to advance these projects through the various stages to meet the goals described within the WMP.

Status and Timeline

In addition to the map SDG&E is providing, SDG&E is including a table below that will show the transmission line, mileage, stage gate status, and anticipated energize date for all transmission lines located within the HFTD with planned energization dates within the WMP plan period.

SDGE 6 Table 20
SDG&E Transmission Lines Planned to be Fire Hardened from 2020-2022

Transmission Line	Miles to be Hardened by Project	Current Project Status	ISD
TL23001	7.3	Closeout	Mar-20
TL23004	7.3	Closeout	Mar-20
TL649	7.0	Closeout	Mar-20
TL626 (CNF)	18.8	Closeout	May-20
TL6923 (CNF)	13.5	Closeout	Jul-20
TL629A (CNF)	22.5	Construction	Sep-20
TL6912	5.6	Construction	Sep-20
TL13838	3.1	Final Engineering and Permitting	Sep-21
TL13831	6.5	Final Engineering and Permitting	Nov-21
TL636	4.6	Preliminary Engineering and Design	Feb-22
TL639	3.3	Preliminary Engineering and Design	Mar-22
TL6926	7.0	Final Engineering and Permitting	Mar-22
TL6916	4.2	Preliminary Engineering and Design	Apr-22
TL694	4.7	Preliminary Engineering and Design	Nov-22
TL698	4.2	Preliminary Engineering and Design	Nov-22

G. Condition SDGE-7: Potential Redundancies in Vegetation Management Activities

In its first quarterly report, SDG&E shall:

i. *describe how it assesses its vegetation management processes to determine effectiveness; and*
ii. *provide additional evaluation on how inspections overlap with one another both in timing and scope, including evaluation of effectiveness in terms of number and quality of findings per inspection. For example, if not many findings are being made, then SDG&E should provide an assessment of whether additional efforts are necessary.*

Effectiveness of Vegetation Management Program

SDG&E performs a QA/QC audit on a sample population of all completed work activities including pre-inspection, tree trimming, and pole brushing. The audits are performed by an independent, third-party contractor. A percentage of all work is reviewed for quality and accuracy of work, regulatory compliance, and adherence with contractual requirements. Audit findings are recorded, quantified, and reported to the contractors upon completion. The contractor corrects audit findings at no cost to SDG&E. Reports are used to drive contractor performance.

Tree trimming activities provide an example of Vegetation Management's (VM) audit process . Auditing of tree trimming includes an assessment of the clearances obtained by the tree crew, proper pruning practices, compliance, and worksite cleanup. SDG&E uses this third party auditing, as well as internal audit activities, to ensure field activities measure up to its tree trimming procedures and regulatory standards.

Another metric SDG&E uses to determine the effectiveness of its VM activities is in the number of tree-related outages. SDG&E performs a root cause investigation of every tree-related outage. Information collected includes the tree species, characteristics, condition, health, and mechanics of the outage. SDG&E documents all outages within a database that has robust reporting capabilities. The number of tree-related outages can be a key indicator of the overall success of the program. Data indicates that each year the number of outages caused by trees is a very small percentage of the total number of outages SDG&E experiences.

Timing and Scope of Inspections

SDG&E Vegetation Management follows an annual Master Schedule of activities including pre-inspection, auditing, tree trimming, and pole brushing. These activities take place within specific months of the calendar year with defined Vegetation Management Areas (VMA). Each activity has a specific and detailed scope and procedures. Inspection activities do not overlap in timing. The only potential redundancy in activities occur during the pre-inspection and post-trim audit. During routine tree pre-inspection every span of line is visited, and all inventory trees are assessed. SDG&E also performs an additional, off-cycle patrol each year within the HFTD. This patrol is conducted approximately 6 months following the routine inspection

activity and effectively serves as a “mid-cycle” patrol. This patrol performed in conjunction with the post-trim audit activity allows for a second look at all trees within the HFTD to ensure conditions have not changed that could result in a tree/line conflict.

H. Condition SDGE-8: Consideration of Environmental Impacts, Local Community Input

In its first quarterly report, SDG&E shall describe:

i. how it measures and accounts for the potential environmental impacts related to its vegetation management work; and

ii. how it incorporates input from local stakeholders in planning and executing its vegetation management work.

Potential Environmental Impacts

SDG&E's VM activities are performed in accordance with state and federal environmental regulations for the protection of species, habitat, and cultural resources. SDG&E follows its Natural Communities Conservation Plan (NCCP) which outlines specific protocols that must be followed during utility maintenance operations to prevent negative impact to biological and cultural resources. The NCCP outlines constraints to operations and establishes timeframes and monitoring required to perform activities. One of the requirements of the NCCP is to perform an environmental review of the project work to assess any potential impacts. Work may proceed once a review is completed and the project receives an Environmental Release. During tree trimming operations, SDG&E annually conducts these activities outside bird breeding season within major water courses to avoid impacting active bird nests.

Input from Local Stakeholders

SDG&E engages customers, homeowner associations, cities, county, state, and federal agency stakeholders in the planning and execution of its work. SDG&E has a customer outreach program that uses its website and print copy to explain in detail the scope of work and the safety and reliability benefits of utility tree operations. Outreach and engagement activities, which include both SDG&E and contractors, include participation in community meetings, community fairs, city council hearings, and multiple tree planting events throughout the year. Utility line clearance operations are a unique niche within the green industry and, therefore, its scope needs to be addressed and incorporated within easement language, city tree ordinances, permits, local codes, etc. As stated above, SDG&E's VM activities follow a specific annual schedule that can be shared with all interested stakeholders to facilitate planning, scheduling, and execution of work.

I. Condition SDGE-9: SDG&E Does Not Explain How Investments in Undergrounding Reduce Planned Vegetation Management Spend

In its first quarterly report, SDG&E shall describe:

i. whether and how it takes ancillary cost savings into account when evaluating the effectiveness of undergrounding initiatives; and

ii. how SDG&E plans to account for realized cost savings through a reduced need for certain vegetation management activities, resulting from its undergrounding investments.

Evaluation of Effectiveness of Undergrounding Initiatives

Vegetation management cost savings associated with undergrounding are dependent on whether the undergrounding project is replacing existing overhead lines where vegetation management activities have historically been utilized and whether any vegetation management will be required for any of the new underground equipment (*i.e.*, root encroachment). For future undergrounding projects that are being planned, designed and field reviewed, SDG&E will give consideration to existing vegetation (and avoided costs), as well as minimizing impacts to vegetation, where practical, which will be impacted both during construction as well as for on-going maintenance of the underground system.

Since new underground alignments are typically installed in roadways and generally do not follow the existing overhead alignment they are replacing, a determination can be made whether any vegetation management cost savings can be realized. This may be conducted by comparing vegetation management requirements of the new underground alignment with any avoided vegetation management costs from the existing overhead line being removed from service. The SDG&E Vegetation Management Program has an inventory, including individual tree and brush records, that can be used to determine what cost savings can be achieved by comparing any new vegetation management work with the new underground facilities against the historical costs for any overhead facilities being permanently removed.

Impact of Undergrounding Investments on Vegetation Management Activities

Undergrounding of power lines are just one of the tools SDG&E uses in its Wildfire Mitigation Plan to harden the electric system and reduce fire risk. While evaluating areas and circuits for the optimum system hardening solution SDG&E considers risk reduction (both wildfire and PSPS) as well as cost. Going forward, SDG&E will consider vegetation management cost avoided as part of SDG&E's RSE calculations for its undergrounding program. As yearly WMP plans are developed, the net vegetation management cost impacts of undergrounding will be incorporated into the financial forecasts. Because SDG&E can quantify the number of inventory trees and brushed poles along the lines scheduled to go underground, the cost savings associated with the inspection of these assets and average, historic cost of trimming and brushing can be estimated.

J. Condition SDGE-11: Lack of Detail on Vegetation Management Around Substations

In its first quarterly report, SDG&E shall:

i. describe how it plans fuels reduction work around its substations; and

ii. whether and how it maintains defensible space around its substations.

SDG&E describes its required vegetation clearances and defensible space around substations in SDG&E's Substation Landscaping Standard SES-5103, attached as Appendix G. The overhead transmission and distribution structures located directly outside of substations are inspected and trimmed by vegetation management in accordance with CPUC and NERC standards.

To ensure the requirements in the above standards are met, SDG&E utilizes Qualified Electrical Workers (QEWs) to conduct substation inspections. There are two main types of inspections, a weekly security check and a monthly/every-other-month detailed inspection. The weekly security check is primarily to check for the integrity of the substation perimeter and to ensure there is no intrusion, like a hole cut in a fence. Any severe vegetation encroachment that presents a hazard to the sub would also be noted. The detailed inspections checklist has a section to check for tree/vegetation encroachment, so on a regular basis, inspectors are ensuring that that the vegetation standards are being met. When vegetation issues are found, follow up work is issued to complete the necessary trimming or fuel removals.

K. Condition SDGE-12: Details of Quality Assurance, Quality Control

In its first quarterly report, SDG&E shall:

i. describe the process and measures for how its quality assurance and quality control (QA/QC) efforts evaluate the effectiveness of vegetation management and inspection activities,

ii. list and describe all QA/QC audits performed, the timing of the audits, and the quantitative results of such audits, and

iii. list and describe all changes implemented as a result of QA/QC audit findings.

QA/QC to Evaluate Effectiveness of VM and Inspection Activities

SDG&E utilizes a third-party contractor to perform the QA/QC audit on a representative sample population of all completed work activities including pre-inspection, tree trimming, and pole brushing. The work is reviewed for quality, accuracy, regulatory compliance, and adherence to contract. The audits are generated from SDG&E's work management system called PowerWorkz. The audit sample or stratification percentage is based on the population size, crews and voltage types. The sample is randomized and varies each time it is generated. The audit is performed under an assigned work order. Audit criteria are varied and specific to the activity and include: trim clearance, cleanup, correct pruning practices, tree data, and compliance. Audit findings are recorded, quantified, and reported to the contractors upon completion. The contractor corrects audit findings at no cost to SDG&E. Reports are used to drive contractor performance. SDG&E uses this third party auditing, as well as internal audit activities, to ensure field activities measure up to its tree trimming procedures and regulatory standards.

QA/QC Audits

QA/QC audits are performed on pre-inspection, tree trim and pole brush activities. Audit of pre-inspection includes validating data input, the addition and removal of tree records based on inventory criteria, correctly identifying trees to be worked, documented justification for deficiencies during inspection (such as inability to gain access on a property for inspection), and any work restrictions that may be required. Audits of tree trimming includes an assessment of the clearances obtained by the tree crew, proper pruning practices, proper tree removal treatment, compliance, and worksite cleanup. Clearances indicate whether a tree will likely hold compliance for the annual cycle. Audits of pole brushing include vegetation removed to bare mineral soil in the 10 foot radius at the base of the pole, tree limbs in the radius are pruned back, debris removed from within the required cleared radius, and proper application of approved herbicide. The audit activities follow the Vegetation Management annual Master Schedule, which is static. The Master Schedule includes a specific start date and finish date for each activity. Quantitative results or facts pertaining to the quality and compliance of each activity are based on observation, validation and measurements pertaining to the quality and

compliance of the completed work. The average audit results for each of the VM activities in 2019 are as follows: Pre-Inspection performance: 99.47% pass; tree trim: 99.05% pass; and pole brush: 99.59% pass. Additionally, Vegetation Management also receives a formal internal annual audit. As noted, this activity reviews internal VM audit documentation and processes to ensure compliance with internal procedures and regulatory compliance.

Changes Implemented as a Result of QA/QC Audits

A common, historic audit finding was insufficient clearances obtained on fast-growing species at time of trim. In response, SDG&E began instructing its tree contractors to apply a post-trim clearance that was not pre-set and to instead apply site specific criteria such as species, growth rate, and line/tree movement in order to maintain compliance for the annual cycle. Audit findings related to pre-inspection primarily involve whether a tree was correctly listed to be pruned. Changes implemented as a result of such findings resulted in the requirement for more frequent and robust internal auditing and refresher training. Audit findings related to pole bushing include insufficient clearing of vegetation in the required radius. Changes implemented as a result of such findings resulted in the requirement for more frequent and robust internal auditing by the contractor, refresher training and the implementation of measurement tools.

L. Update on Condition SDGE-13: Lack of Risk Reduction or Other Supporting Data for Increased Time-or-Trim Clearances

As described in its 2020 WMP Remedial Compliance Plan, SDG&E's plan to measure the performance of enhanced clearances involved trimming trees to the enhanced clearance level, and then measuring the reliability performance of the electric system near those trees before and after the trimming. And while that will measure the effectiveness of this program on a going forward basis, SDG&E does have trees in the system that are trimmed to 20 – 30' clearance and was able to develop a study to measure the impacts of post trim clearance on vegetation contacts and ultimately ignitions.

To begin the study, SDG&E queried the vegetation database for outages caused by individual trees that had a post trim clearance associated with the tree at the time of the outage. At the outset, SDG&E's original goal was to utilize 20 years of data (2000 through 2019), but the data set was incomplete for years 2000 and 2001. While SDG&E has recorded vegetation contacts since 1995, SDG&E started recording outages for specific trees in its vegetation management database starting in the year 2000. There were some process issues in recording the data in the early years, however as this table demonstrates. Accordingly, SDG&E truncated the data set to 2002 – 2019.

SDGE-13 Table 21
Vegetation Contacts

	Contacts with post trim clearance	All Outages	% Trees with a trim
2000	4	42	9.5%
2001	21	64	32.8%
2002	46	102	45.1%
2003	58	113	51.3%
2004	37	72	51.4%
2005	32	70	45.7%
2006	62	79	78.5%
2007	43	71	60.6%
2008	52	107	48.6%
2009	40	78	51.3%
2010	55	130	42.3%
2011	18	29	62.1%
2012	25	39	64.1%
2013	21	29	72.4%
2014	36	48	75.0%
2015	21	28	75.0%
2016	39	65	60.0%
2017	38	70	54.3%
2018	30	36	83.3%
2019	21	31	67.7%
Total	699	1303	53.6%

The study concept involved measuring the amount of historical contacts from trees that had been in SDG&E's tree inventory and trimmed to a certain measured line clearance by SDG&E certified arborists. As this study is focused on the impact that trimming trees to a certain clearance has on vegetation contacts, contacts from trees that were not in inventory (had never been trimmed) or contacts from fall in trees were excluded from this data set. Below is a table containing the vegetation contact data.

SDGE-13 Table 22
Outages by Post Trim Clearance

Outages by Post Trim Clearance											
Year	2.1 to 4.0 ft	4.1 to 5.9 ft	6.0 to 7.9 ft	8.0 to 9.9 ft	10.0 to 11.9 ft	12.0 to 14.9 ft	15.0 to 19.9 ft	20.0 to 30.0 ft	30.1 to 40.0 ft	40.1 to 50.0 ft	50.1 - 60.0 ft
2002	2	8	1	19	15						
2003	0	6	4	20	26						
2004	0	1	3	6	26						
2005	0	1	3	4	24						
2006	0	0	3	4	54	0	0	0			
2007	1	0	3	1	37	1	0	0			
2008	1	1	2	3	41	2	0	1			
2009	0	3	1	0	32	2	1	1			
2010	0	1	2	2	45	0	3	2			
2011	0	0	0	0	17	0	1	0			
2012	0	0	0	0	22	3	0	0			
2013	1	0	0	0	15	2	0	1			
2014	0	2	0	2	26	3	1	1			
2015	2	1	0	0	18	0	0	0	0	0	0
2016	0	0	0	1	32	3	3	1	0	0	0
2017	0	1	1	1	33	2	1	0	0	0	0
2018	0	0	1	0	26	1	2	0	0	0	0
2019	0	0	2	0	17	2	0	0	0	0	0
Average contacts per year	0.4	1.4	1.4	3.5	28.1	1.5	0.9	0.5	0.0	0.0	0.0

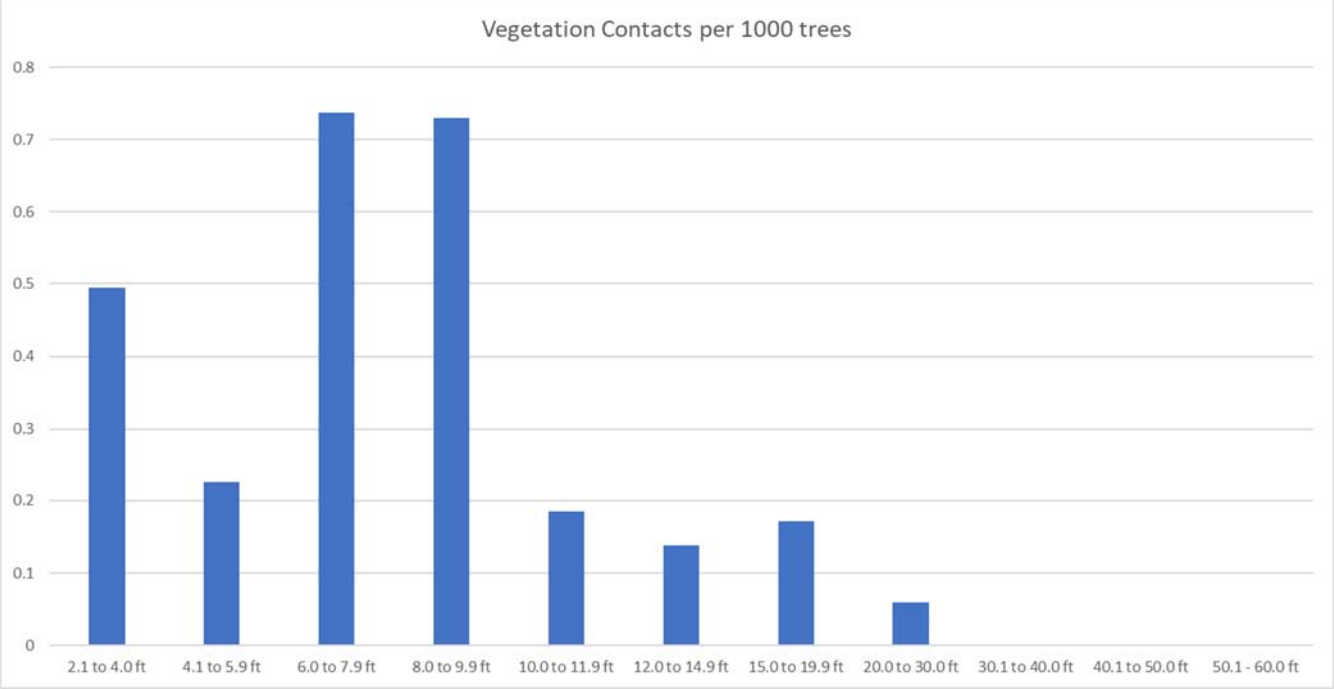
The next part of the study involved understanding the total tree exposure at these same post trim clearance levels so that a vegetation contact rate could be calculated. Ideally, SDG&E would have the entire tree inventory at the end of each year as a snapshot, by post trim clearance, but SDG&E did not record the data in that way. The best available data is the number of trees trimmed in a particular year to a post trim clearance level, which is the best proxy for inventory in this way because even though SDG&E does not trim every tree in the inventory every year, the number of trims are proportional to the inventory levels. Below is a chart showing the number of trims to post trim clearance levels by year.

SDGE-13 Table 23
Trees Trimmed to Clearance Levels

	Trees Trimmed to Clearance Levels										
Year	2.1 to 4.0 ft	4.1 to 5.9 ft	6.0 to 7.9 ft	8.0 to 9.9 ft	10.0 to 11.9 ft	12.0 to 14.9 ft	15.0 to 19.9 ft	20.0 to 30.0 ft	30.1 to 40.0 ft	40.1 to 50.0	50.1 - 60.0
2002	910	4898	7787	27024	146090						
2003	768	5643	5254	16409	124730						
2004	359	9170	2787	3012	208161						
2005	329	5288	1922	2010	129322						
2006	430	5197	2052	2338	134801	6651	2222	2242			
2007	398	4708	1258	1627	121886	5545	1916	3203			
2008	403	5452	938	870	119608	2653	2952	6236			
2009	411	6630	872	820	140447	4902	3743	8183			
2010	173	6141	675	708	136307	5325	2747	8181			
2011	149	5779	714	664	144950	13106	2838	7489			
2012	175	5716	531	581	154370	9629	3177	6671			
2013	183	5568	414	398	148557	7716	3385	6099			
2014	1005	7368	1144	3697	203175	14008	6690	8025	2575	201	135
2015	1843	6285	1336	5031	193353	12925	7095	10457	2235	152	42
2016	1327	7313	1542	5080	191139	18308	9008	13770	3621	316	89
2017	1264	6135	1496	3459	145121	14955	7401	9856	2058	238	144
2018	1809	7148	1839	5488	164436	15922	7238	13359	2251	615	174
2019	2229	6484	2701	7067	136322	20096	9808	15154	2664	486	155
Average	787	6162	1959	4794	152376	10839	5016	8495	2567	335	123

SDG&E then divided average vegetation contacts per year at a clearance level by the trees trimmed at clearance level to determine the contact rate. As these numbers are small, SDG&E normalized the data by reporting the contact rate per 1,000 trees. Below is the resulting chart.

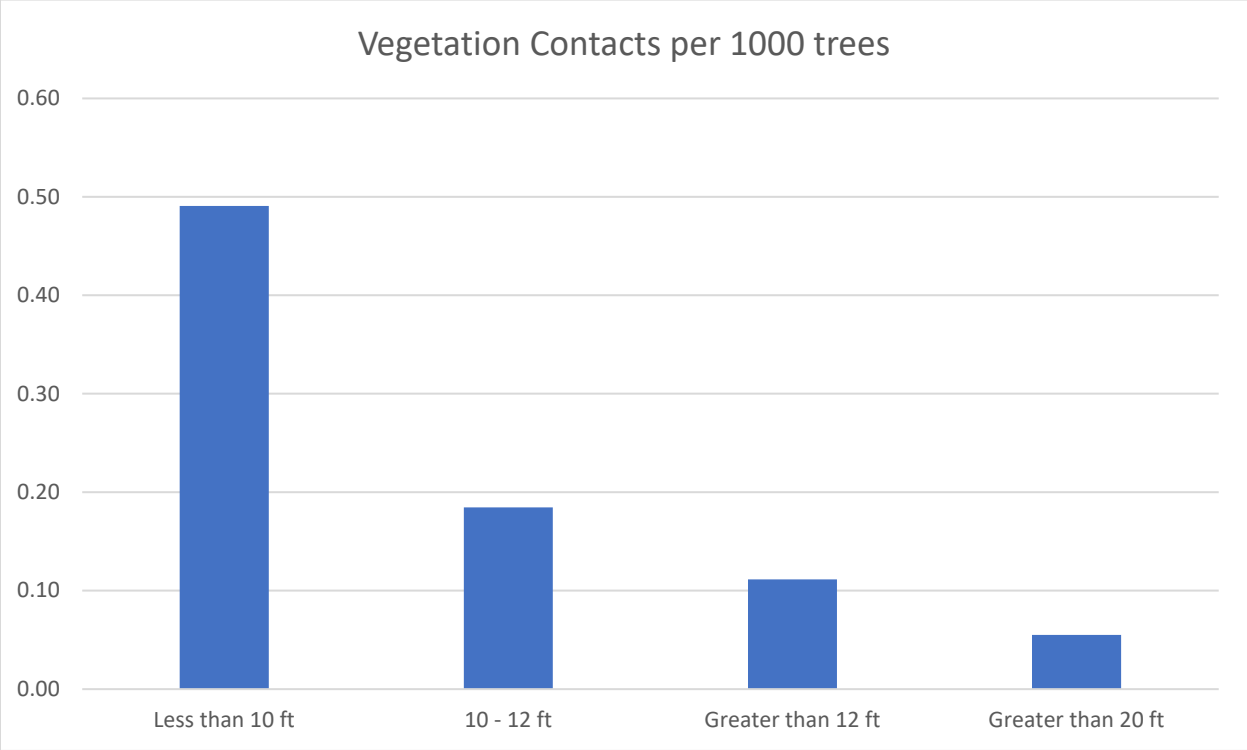
SDGE-13 Figure 16
Vegetation Contacts per 1,000 Trees



As shown by the chart, there is a relationship between post trim clearance and contact rates. As post trim clearance increases, the contact rates go down. To further illustrate this conclusion, SDG&E grouped the data into four categories. These groupings follow the same methodology described above. Set forth below are the results of the grouped data. SDG&E

maintained the 10 – 12’ trim level as an individual category because the majority of trees in SDG&E’s inventory are trimmed to this level.

SDGE-13 Figure 17
Vegetation Contacts per 1,000 Trees – By Group



This data demonstrates that increased post trim clearances decreases vegetation contacts are valid. It also demonstrates that stakeholder concerns regarding diminishing returns are valid too. Going from less than 10’ to 10’ - 12’ represents a .31 vegetation contact per 1000 trees reduction, while going from 12’ to greater than 20’ represents a .13 vegetation contact reduction per 1000 tree reduction. In fact, SDG&E would estimate that going from less than 10’ to 10 -12’ has an even greater impact than this data demonstrates, as SDG&E has already completed most of the trims to get its inventory to this level prior to 2002. The trees that remain at less than 10’ remain so because SDG&E’s arborist inspections determined that these specific trees were safe at these levels.

Nevertheless, even with diminishing returns, trimming to 20’ represents a 58% reduction in contact rate. For practical purposes, SDG&E’s program has targeted 80,000 trees within the HFTD for this greater level of clearance. 80,000 * .13 / 1000 = 10.4 vegetation contacts reduced annually. Given that SDG&E currently averages 40 vegetation contacts per year, this would represent a 25% reduction in both vegetation contacts and ignition risk. While this risk

reduction is less than what SDG&E had originally estimated, based on SDG&E's current average cost per trim, this program remains risk spend efficient.

In addition to the information presented on the study, SDG&E would like to clarify the scope of the enhanced vegetation management program. The enhanced vegetation management program is targeting greater clearances on specific high-risk species (described in SDG&E-14 below), that are located in the HFTD. When SDG&E discusses achieving enhanced clearances up to 25' where feasible, it is talking about the high-risk tree species that have tree canopies located above the adjacent power lines, a radial clearance from 0-180 degrees versus 0 – 360 degrees. SDG&E is not trying to achieve a 25' radial clearance from all vegetation including native plants, grasses, shrubs, or trees that are located below the power lines. SDG&E maintains compliant clearances on trees that grow under power lines to ensure a grow in does not occur, but there is no need to increase clearances on these trees, because they are not at risk of shedding branches in wind events that could blow into the power lines. SDG&E agrees that native plants and vegetation can actually help slow the spread of fires and has no intention of clear cutting native vegetation below its power lines, its only objective is to trim back or remove trees with canopies located above the power lines that have the potential shed branches that could contact the power lines and result in a potential ignition.

M. Condition SDGE-14: Granularity of "At Risk Species"

In its first quarterly report, SDG&E shall detail the following:

i. *all tree species within the genera identified in its list of "at-risk" trees,*
ii. *the measures, properties and characteristics it considers in identifying "at-risk" trees, and*
iii. *the threshold values of the measures, properties and characteristics identified in (ii) above that result in a species being defined as "at-risk."*

At Risk Tree Species

The following are the genera identified within SDG&E's "at risk" trees:

- *Eucalyptus polyanthemos*
- *Eucalyptus globulus*
- *Eucalyptus sideroxylon*
- *Eucalyptus camaldulensis*
- *Eucalyptus corymbia*
- *Eucalyptus cladocalyx*
- *Eucalyptus viminalis*
- *Pinus halepensis*
- *Pinus canariensis*
- *Pinus radiata*
- *Pinus torreyana*
- *Pinus ponderosa*
- *Pinus jeffreyi*
- *Pinus coulteri*
- *Quercus chrysolepis*
- *Quercus agrifolia*
- *Quercus kelloggii*
- *Quercus englemannii*
- *Washingtonia robusta*
- *Syagrus romanzoffiana*
- *Platanus racemosa*

Criteria Considered for At Risk Tree Species Designation

The properties and characteristics used in determining "at-risk" species include:

- Relative frequency of outages involving species
- Known structural failure characteristics
- Tree height
- Fast growth rate
- Mechanical (e.g., detached fronds)
- Shallowly-rooted
- Soft wood species
- Susceptibility to disease, insect infestation

Just as SDG&E did for line clearance, SDG&E looked at the vegetation contacts by year from 2002 through 2019. The following are the results for any species with outage history during that timeframe. In addition to the characteristics described above, SDG&E selected the top five species with the greatest historical outage contribution. The top 5 high risk species make up 80% of SDG&E's vegetation contacts.

SDGE-14 Table 24
Species Outage History

Species	Average Inventory	Average Outages per year	% of total outages
Eucalyptus	48116	25.50	41.9%
Palm	11223	12.50	20.5%
Pine	11509	8.11	13.3%
Oak	19510	3.72	6.1%
Sycamore	3118	1.11	1.8%
Pepper (California)	8462	0.94	1.6%
Cottonwood	1931	0.72	1.2%
Avocado	11838	0.72	1.2%
Cypress	473	0.67	1.1%
Ash	4706	0.61	1.0%
Century Plant	401	0.50	0.8%
Ficus	1587	0.50	0.8%
Willow	9099	0.50	0.8%
Silk Oak	1578	0.44	0.7%
Tamarisk/Salt Cedar	1310	0.39	0.6%
Acacia	1262	0.33	0.5%
Jacaranda	2008	0.33	0.5%
Elm	2947	0.33	0.5%
Deodara Cedar	524	0.28	0.5%
Cedar	581	0.28	0.5%
Pecan	671	0.28	0.5%
Fir	223	0.22	0.4%
Chinaberry	357	0.22	0.4%
Italian Cypress	1237	0.22	0.4%
Araucaria	210	0.17	0.3%
Camphor-Tree	255	0.17	0.3%
Birch	54	0.11	0.2%
Brisbane Box	504	0.11	0.2%
Liquidambar	1774	0.11	0.2%
Brush 5X5 Bamboo	4021	0.11	0.2%
Orchid	91	0.06	0.1%
Paloverde	96	0.06	0.1%
Sumac	147	0.06	0.1%
Bottlebrush	228	0.06	0.1%
Coral	231	0.06	0.1%
Pittosporum	289	0.06	0.1%
Casuarina	304	0.06	0.1%
Citrus	390	0.06	0.1%
Podocarpus	658	0.06	0.1%
Pepper-Brazilian	2427	0.06	0.1%
Walnut	215	0.06	0.1%

Criteria for At Risk Tree Species Designation

Threshold values include:

- Tree height above and horizontal distance from lines;
- Compromised branch/trunk structure;
- Iincluded bark;
- Slope and aspect of tree location;
- Soil condition;
- Tree lean;
- Dead/dying/diseased;
- Canopy exposure to wind;
- Surrounding canopy density;
- Past pruning practices;
- Trunk/branch cavities;
- Fire damage;
- Previous breakout;
- Fast-growing

N. Condition SDGE-15: Details of Centralized Data Repository

In its first quarterly report, SDG&E shall:

i. list and describe all data it plans to provide in its centralized repository;
ii. list and describe the sources and treatment of all data identified in (i) above; and
iii. describe the frequency it plans to update all data identified in (i) above.

Centralized Repository Data

SDG&E is in the process of building a Centralized Data Repository (CDR) for wildfire-related data. This CDR will provide a "single source of truth" for SDG&E's wildfire-related data, for use by multiple internal and external stakeholders in the future.

In response to the WSD's data schema and other related regulatory initiatives, SDG&E is making significant enhancements to the CDR that will make it scalable and sustainable to accommodate future regulatory requirements. SDG&E will pursue technology solutions to automate these data requests where possible. This work will continue through 2021 to ensure accuracy, consistency, and comparability across the California utilities WMPs. The data in the CDR will include detailed asset, project, and event data along with taxonomy and metrics.

These metrics are detailed in the 2020 WMP Guidelines and WMP Metrics. The metrics include:

a. Progress metrics (#1 through 10)
b. Program targets (per SDG&E's own specific targets in the WMP Tables #1 – 13)
c. Outcome metrics
    i. Leading indicators (Group 1A - #1-5 and Group 2A - #9)
    ii. Lagging indicators (Group 1B - #6-8 and Group 2B - #10-20)

Sources of Centralized Repository Data

SDG&E is in the process of designing and implementing a Data Governance Framework (DGF). The DGF will define a set of repeatable standards, policies, processes and controls for wildfire-related data. The mission of the DGF is to enable improved decision making in support of implementing effective measures in preventing utility-related wildfire ignitions. Similar to the WSD's Data Strategy,[11] the vision of our DGF is to make our wildfire-related data actionable, accessible, aligned, and auditable. The standards and policies of the DGF will be overseen by the WMP Program Owners.

The sources of the wildfire-related data will come from multiple systems across the SDG&E enterprise to meet the metric reporting requirements outlined above. The CDR will include a

[11] Available at: https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/About_Us/Organization/Divisions/WSD/Appendix_3_DataStrategy_WSD_DRAFT_vF.pdf

data dictionary as well as identify data owners, data source systems and required data format for each data element.

All data sources populating the CDR will be required to be in compliance with the DGF standards, policies and controls. Data standards are a consistent set of rules governing how data must be defined, documented and protected. Data policies describe the rules controlling the integrity, security, quality, and use of data during its lifecycle and state change. Data in the CDR will be audited on a periodic basis to determine if the controls are properly defined and are operating effectively. Findings resulting from the internal audits will be assigned to the responsible data owner for corrective action.

Frequency for Updates to Centralized Repository Data

The SDG&E CDR containing the data related to this deficiency will be updated on a daily, weekly, monthly and annual basis depending on the requirements of the defined metric.

O. Condition SDGE-16: Details of Cooperative Fuel Reduction Work

In its first quarterly report, SDG&E shall describe:

i. *whether it plans to collaborate with the USFS on fuel reduction programs in its service territory;*
ii. *what programs or agreements, if any, it has in place with the USFS for fuel reduction programs;*
iii. *the timeline for implementing initiatives identified in (i) and (ii);*
iv. *how it plans to identify the resources needed to collaborate with the USFS on fuel reduction; and*
v. *the status of reaching any formal agreements on fuel reduction efforts.*

Collaboration with the U.S. Forest Service

SDG&E will begin discussions with the U.S. Forest Service (USFS) on long-term fuels management activities on Forest System lands in the third or fourth quarter of 2020.

Programs/Agreements with USFS for Fuel Reduction Programs

Currently, SDG&E does not have any agreements with USFS that would allow for long-term implementation of SDG&E's fuels management program. Implementation of SDG&E's fuels management program on Forest System lands in 2019 was permitted by USFS as it was consistent with SDG&E's Master Special Use Permit solely for testing as a pilot program.

Timeline for Implementing Initiatives

It is anticipated that reaching an agreement with USFS for implementation of a long-term fuels management program will take two to three years.

Resources to Collaborate with USFS on Fuel Reduction

The resources needed to collaborate with the USFS will depend on the agreed upon scope of activities. The scope of application for these activities will be contingent on USFS acceptable level of vegetation modification considering species and habitat impact.

Status of Formal Agreements on Fuel Reduction Efforts

Currently, SDG&E does not have formal agreements documented with the USFS on fuel reduction efforts.

APPENDIX A
CONDITION GUIDANCE 5

Appendix A - Guidance-5

Number	Category	Initiative	Tracked Separately?	Mitigation Category	YTD Capital (000)	YTD O&M (000)	Effectiveness of mitigation at reducing ignition probability or wildfire consequence	List all data and metrics used to evaluate effectiveness described in iii, including thresholds values used to differentiate between effective and ineffective initiatives
A.1	**A. Risk mapping and simulation**	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	Yes	Foundational Supporting Risk Mitigation Activity	$ 253.5	$ -	NA	NA
B.1	**B. Situational awareness and forecasting**	Advanced weather monitoring and weather stations	Yes	Foundational Supporting Risk Mitigation Activity	$ 495.5	$ -	NA	NA
B.3		Fault indicators for detecting faults on electric lines and equipment	Yes	Customer Impact Mitigation	$ 272.3	$ -	In SDG&E's previous RAMP and 2020 WMP filing, SDG&E considered the effectiveness of all risk mitigations in the context of reducing ignition probability or wildfire consequence. Therefore, mitigations that reduced customer impacts of wildfire mitigation were said to be 0% effective. The disabling of reclosing and the enabling of sensitive setting can lead to miscordinated protection devices that make fault finding difficult. While these mitigations reduce the risk of wildfire, they have a negative impact on reliability. Wireless fault indicators mitigate that reliability impact on customers by providing information on where to look for a fault, so the damage can be identified faster and customers can be restored sooner.	Going forward, SDG&E plans to measure the effectiveness of Customer Impact mitigations by measuring their impact on reliability criteria including # of customers impacted and outage duration. effectiveness for this particular mitigation could be measured by comparing the average outage duration of a circuit with wireless fault indicators to circuits without wireless fault indicators. Compare the two means using a statistical test, see if the durations are statistically significantly shorter for the circuits with wireless fault indicators
B.4		Forecast of a fire risk index, fire potential index, or similar	Yes	Foundational Supporting Risk Mitigation Activity	$ 557.1	$ 1,145.2	NA	NA
C.1	**C. Grid design and system hardening**	Capacitor maintenance and replacement program	Yes	Direct Wildfire Mitigation Activity	$ 133.3	$ -	The effectiveness is currently under evaluation but was forecasted to be 80% effective. Currently with capacitors, should internal arcing occur three fuses are used to isolate the capacitor before a can rupture could occur, causing a fault that could lead to an ignition. The new capacitors will be installed with relays which are much more sensitive than a fuse at detecting anomalies and isolating the capacitors before a fault occurs. Based on the logic, our experts estimated this mitigation to be 80% effective.	SDG&E plans to measure effectiveness in the future by comparing capacitor related faults on the system before and after hardening. Faults would be normalized by operating years to ensure apples to apples comparisons. A statistical test would could be performed to see if the reduction in fault rate is significant.
C.2		Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	Yes	Direct Wildfire Mitigation Activity	$ 4,310.3	$ -	The effectiveness of falling conductor protection is currently under evaluation. It is 100% effective in the lab and in field commission testing, but the field installations have not seen any wire downs in live action. As SDG&E installs more of these devices, and they gain some years in operation, opportunities to act will come.	SDG&E plans to measure effectiveness by tracking wire down events, that specifically involve broken strands of conductor, located between advanced protection devices. If the devices isolated the wire down and no significant fault current was detected, then the protection was successful and a fault was prevented. If the device failed to detect, had communication issues, or detected but couldn't operate in time, and a fault occured, then this would be an undesirable outcome. Effectiveness would be measured as successful operations over total opportunities. And every success would equal one less fault on the system. Ignition reduction would be calculated as total faults prevented times the five year average ignition ratio for wire downs.
C.3		Covered conductor installation	Yes	Direct Wildfire Mitigation Activity	$ -	$ -	The effectiveness of covered conductor is currently under evaluation but is estimated to be 90% based on the fact it mitigates both equipment failures and most foreign object in line contacts. To determine this value, SDG&E looked all the ignition causes, and determined that if pilots prove covered conductor works as designed, all equipment faults and all foreign object faults with the exception of large vegetation vehicle contacts would be mitigated.	Once SDG&E installs more covered conductor in the electric system, SDG&E plans on measuring effectiveness by comparing faults on the distribution lines before and after covered conductor installations. SDG&E will normalize the results by dividing by operating years to calculate an apples to apples fault rate for before and after. SDG&E will then test the mean rates to see if covered conductor fault rates are statistically significantly reduced.
C.6		Distribution pole replacement and reinforcement, including with composite poles	Yes	Direct Wildfire Mitigation Activity	$ 6,301.4		This mitigation is grouped with wood pole intrusive inspections. This represents the amount of repair work generated by that inspection type.	Effectiveness of inspections cannot be directly measured, as inspections are proactive measures. They identify issues that could lead to failures and repair them before the failures occur. That said, in SDG&E's maintenance history, there have been times where issues identified for repair failed before repairs were made. Lessons learned from this led to the priority system SDG&E uses today. SDG&E calculates an estimated effectiveness by first, filtering the issues identified or condition codes only to those that could lead to faults and ignitions, and then by categorizing those conditions into emergency, priority, and non-critical. These categories are associated with time frames, emergency orders must be repaired in 0-3 days, priority within 30 days, and non critical within one year. Based on this SDG&E developed a fault rate associated with the criticality. All emergencies were expected to cause a fault 25% of the time if not addressed within the next inspection cycle. Given 3 days for emergency and 30 days for priority, SDG&E divided the failure rate by 10 for priority, assuming 8.0% would lead to faults if not repaired before the next cycle. And finally, for non critical going from 1 month to 12 months, SDG&E divided the 2.5% by 12 to get an assumption of .2% of non critical issues would lead to faults if not addressed before the next inspection cycle. SDG&E then calculated ignition avoided by multiplying faults avoided by the overall 5 year average fault to ignition percent, which was calculated to be 2.08% from table 11.
C.7		Expulsion fuse replacement	Yes	Direct Mitigation Activity	$ 8,334.9	$ -	The effectiveness of preventing ignitions from fuse operations by utilizing the new Cal Fire approved fuse is under evaluation, but was estimated to be 80% based on subject matter expert analysis of the new technology compared to the old technology	Effectiveness of the new fuses compared to the old fuses will be measured by comparing the number of ignitions to the number of fuse operations from the old fuses by the number of ignitions over the number of operations of the new fuses. The change in ignition rate would represent the % risk reduction.
C.8.1		Grid topology improvements to mitigate or reduce PSPS events (sectionalizing devices)	Yes	Customer Impact Mitigation	$ 4,700.6	$ -	Again, mitigations to the impact of customers were said to have a 0% effectiveness at reducing the risk of wildfire.	Going forward, SDG&E plans to review historical PSPS events and calculate the reduction to customers impacted, frequency of impact, and reduced duration due to the installation of remote sectionalizing devices.
C.8.2		Grid topology improvements to mitigate or reduce PSPS events (Micro Grids)	Yes	Customer Impact Mitigation	$ 1,066.7	$ -	Again, mitigations to the impact of customers were said to have a 0% effectiveness at reducing the risk of wildfire.	Going forward, SDG&E plans to review historical PSPS events and calculate the reduction to customers impacted, frequency of impact, and reduced duration due to the installation of Microgrids
C.10		Maintenance, repair, and replacement of connectors, including hotline clamps	Yes	Direct Mitigation Activity		$ 969.8	This mitigation was specifically to reduce ignitions associated with wire down events. Both the connectors, and the way they were connected to lines led to this mode of failure. This mitigation was expected to be 99% effective, because the way the new connectors are installed on the jumper, no wire down event could occur from this faultier.	This could be measured by searching for connector failures that led to open jumpers on the structures where these connections were installed. SDG&E may need to enhance the way it reports outages to consistently report this failure type as a way to measure this program. At a less direct or macro macro level, SDG&E should see less wire downs and ignitions from wire downs due to this program.
C.11.1		Mitigation of impact on customers and other residents affected during PSPS event (Generator Grant Program)	Yes	Customer Impact Mitigation		$ 2,509.0	Again, mitigations to the impact of customers were said to have a 0% effectiveness at reducing the risk of wildfire.	This program in particular provided small solar powered generator units to power life support equipment for medical baseline customers. As this mitigation does not reduce the scope, frequency, or outage duration of PSPS, it's main benefit is to improve the customer experience by being able to keep critical medical equipment energized. The best way to measure the effectiveness is through program participant customer surveys
C.11.2		Mitigation of impact on customers and other residents affected during PSPS event (Whole Home Generator Program)	Yes	Customer Impact Mitigation		Ref C 11.1, activity tracked separately costs currently grouped	Again, mitigations to the impact of customers were said to have a 0% effectiveness at reducing the risk of wildfire.	Going forward, SDG&E plans to review historical PSPS events and calculate the reduction to customers impacted, frequency of impact, and reduced duration due to the deployment of the generators
C.11.3		Mitigation of impact on customers and other residents affected during PSPS event (customer resiliency programs)	Yes	Customer Impact Mitigation		Ref C 11.1, activity tracked separately costs currently grouped	Again, mitigations to the impact of customers were said to have a 0% effectiveness at reducing the risk of wildfire.	Going forward, SDG&E plans to review historical PSPS events and calculate the reduction to customers impacted, frequency of impact, and reduced duration due to the deployment of the generators
C.16		Undergrounding of electric lines and/or equipment	Yes	Direct Mitigation Activity	$ 10,231.4	$ -	Undergrounding has been measured to prove 100% effectiveness	SDG&E will continue to track and report ignitions, if underground infrastructure ever leads to one, it will adjust it's effectiveness rates accordingly. But given over 60% of SDG&E's infrastructure exposure in the service territory is UG, and 0% of it's ignitions are from UG in it's ignition history, even if one were to happen, UG would still measure to be the most effective mitigation.
C.17.1		Updates to grid topology to minimize risk of ignition in HFTDs (Distribution OH Hardening)	Yes	Direct Mitigation Activity	$ 82,463.5	$ 2,191.2	When SDG&E considered overhead hardening, subject matter experts believed that the new infrastructure would eliminate ignitions from equipment failure, and the increased phase spacing would reduce some of the foreign object in line contacts, but not as effective as covered conductor, this led to an 80% effectiveness estimate.	SDG&E is currently studying the effectiveness of overhead hardening in the distribution system by analyzing faults on the system from 2000-2019. SDG&E looked at the dates the hardened structures went into service and measured the fault rate before and after hardening. Once the study is complete, SDG&E will update the effectiveness of overhead hardening in it's risk models with the measured value.
C.17.2		Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH Hardening)	Yes	Direct Mitigation Activity	FERC	FERC	When SDG&E considered overhead hardening, subject matter experts believed that the new infrastructure would eliminate ignitions from equipment failure, and the increased phase spacing would reduce some of the foreign object in line contacts, but not as effective as covered conductor, this led to an 80% effectiveness estimate.	SDG&E recently completed a study on 17 hardened transmission lines. SDG&E looked at reliability data from 2000-2019 . SDG&E looked at fault rate on pre hardened lines and then the fault rate on hardened lines. SDG&E weighted the fault rates based on miles of infrastructure, and then calculated the weighted average fault rate before and after. SDG&E measured a 79% reduction in fault rate from Transmission Hardening.
C.17.3		Updates to grid topology to minimize risk of ignition in HFTDs (Transmission UG Hardening)	Yes	Direct Mitigation Activity	FERC	FERC	Undergrounding has been measured to prove 100% effectiveness	SDG&E will continue to track and report ignitions, if underground infrastructure ever leads to one, it will adjust it's effectiveness rates accordingly. But given over 60% of SDG&E's infrastructure exposure in the service territory is UG, and 0% of it's ignitions are from UG in it's ignition history, even if one were to happen, UG would still measure to be the most effective mitigation.
C.17.4		Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH distribution underbuilt)	Yes	Direct Mitigation Activity	$ 4,609.1	$ -	When SDG&E considered overhead hardening, subject matter experts believed that the new infrastructure would eliminate ignitions from equipment failure, and the increased phase spacing would reduce some of the foreign object in line contacts, but not as effective as covered conductor, this led to an 80% effectiveness estimate.	SDG&E is currently studying the effectiveness of overhead hardening in the distribution system by analyzing faults on the system from 2000-2019. SDG&E looked at the dates the hardened structures went into service and measured the fault rate before and after hardening. Once the study is complete, SDG&E will update the effectiveness of overhead hardening in it's risk models with the measured value.
C.17.5		Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Transmission OH)	Yes	Direct Mitigation Activity	FERC	FERC	When SDG&E considered overhead hardening, subject matter experts believed that the new infrastructure would eliminate ignitions from equipment failure, and the increased phase spacing would reduce some of the foreign object in line contacts, but not as effective as covered conductor, this led to an 80% effectiveness estimate.	SDG&E recently completed a study on 17 hardened transmission lines. SDG&E looked at reliability data from 2000-2019. SDG&E looked at fault rate on pre hardened lines and then the fault rate on hardened lines. SDG&E weighted the fault rates based on miles of infrastructure, and then calculated the weighted average fault rate before and after. SDG&E measured a 79% reduction in fault rate from Transmission Hardening.
C.17.6		Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution underbuilt on Transmission OH)	Yes	Direct Mitigation Activity	$ 27,216.2	$ -	When SDG&E considered overhead hardening, subject matter experts believed that the new infrastructure would eliminate ignitions from equipment failure, and the increased phase spacing would reduce some of the foreign object in line contacts, but not as effective as covered conductor, this led to an 80% effectiveness estimate.	SDG&E is currently studying the effectiveness of overhead hardening in the distribution system by analyzing faults on the system from 2000-2019. SDG&E looked at the dates the hardened structures went into service and measured the fault rate before and after hardening. Once the study is complete, SDG&E will update the effectiveness of overhead hardening in it's risk models with the measured value.
C.17.7		Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution OH)	Yes	Direct Mitigation Activity		$ -	When SDG&E considered overhead hardening, subject matter experts believed that the new infrastructure would eliminate ignitions from equipment failure, and the increased phase spacing would reduce some of the foreign object in line contacts, but not as effective as covered conductor, this led to an 80% effectiveness estimate.	SDG&E is currently studying the effectiveness of overhead hardening in the distribution system by analyzing faults on the system from 2000-2019. SDG&E looked at the dates the hardened structures went into service and measured the fault rate before and after hardening. Once the study is complete, SDG&E will update the effectiveness of overhead hardening in it's risk models with the measured value.
C.17.8		Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution UG)	Yes	Direct Mitigation Activity	$ 18,374.2	$ -	Undergrounding has been measured to prove 100% effectiveness	SDG&E will continue to track and report ignitions, if underground infrastructure ever leads to one, it will adjust it's effectiveness rates accordingly. But given over 60% of SDG&E's infrastructure exposure in the service territory is UG, and 0% of it's ignitions are from UG in it's ignition history, even if one were to happen, UG would still measure to be the most effective mitigation.
C.18.1		Other (Lightning Arrestor Replacement Program)	Yes	Direct Mitigation Activity		$ -	When SDG&E subject matter experts considered the technology behind the new failure mode of the Cal Fire approved lightning arrestors, they estimated the effectiveness at 80%	Going forward, SDG&E will compare the number of ignitions over lighting arrestor failures before the new arrestors were installed to the ignitions over failures after the new arrestor is installed. The reduction in ignition rate would be the measured effectiveness
C.18.2		Other (LTE Communication Network)	Yes	Grouped Mitigation	$ 8,734.3	$ -	This weather network enables falling conductor protection to work appropriately. Please see C.2	Please see C.2
D.1	**D. Asset management and inspections**	Detailed inspections of distribution electric lines and equipment	Yes	Direct Mitigation Activity		$ 242.7	Based on the methodology described in C.6 SDG&E calculated 30 faults avoided per year and .62 ignitions avoided per year at the 5 year average distribution ignition rate of 2.08%.	These inspections have been going on for years so they are a control, the assumptions is the calculated faults and ignitions would be added to SDG&E's current metrics should SDG&E stop performing the inspections
D.2		Detailed inspections of transmission electric lines and equipment	Yes	Direct Mitigation Activity		FERC	Based on the methodology described in C.6 SDG&E calculated 3 faults avoided per year and .12 ignitions avoided per year at the 5 year average transmission ignition rate of 4.36%	These inspections have been going on for years so they are a control, the assumptions is the calculated faults and ignitions would be added to SDG&E's current metrics should SDG&E stop performing the inspections
D.4		Infrared inspections of distribution electric lines and equipment	Yes	Direct Mitigation Activity		$ 78.1	Based on inspection results, SDG&E calculated 1 fault avoided and .02 ignitions avoided per year	For this inspection method, because the SDG&E is only looking for hot connections that could not be seen visually, and finding whether it be emergency, priority, or non critical is expected to fail within the next cycle, because without the program, it would never be detected. This program is new and is considered a mitigation, so these results subtract from SDG&E's current fault and ignition baseline.
D.6		Intrusive pole inspections	Yes	Direct Mitigation Activity		$ 448.3	Based on the methodology described in C.6 SDG&E calculated 11 faults avoided per year and .23 ignitions avoided per year.	These inspections have been going on for years so they are a control, the assumptions is the calculated faults and ignitions would be added to SDG&E's current metrics should SDG&E stop performing the inspections

Appendix A - Guidance-5

D.9.1		Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (HFTD Tier 3 Inspections)	No	Direct Mitigation Activity		The costs for this activity are embedded within D. 1. In 2021, this will be tracked seperately	Based on the methodology described in C.6 SDG&E calculated 7 faults avoided per year and .151 ignitions avoided per year.	These inspections have been going on for years so they are a control, the assumptions is the calculated faults and ignitions would be added to SDG&E's current metrics should SDG&E stop performing the inspections
D.9.2		Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone flights and assessments)	Yes	Direct Mitigation Activity		$ 20,776.1	Based on the methodology described in C.6 SDG&E calculated 18 faults avoided per year and .38 ignition avoided per year.	These inspections are new and are considered a mitigation. Fault and ignition reductions are expected to be subtracted from SDG&E's current baseline.
D.9.3		Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone Repairs)	Yes	Direct Mitigation Activity	$ 799.2	$ 6,947.3	These are the repairs associated with the inspections above. This is grouped with D9.2	
D.9.4		Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Circuit Ownership)	Yes	Direct Mitigation Activity	$ 42.8	$ -	Based on the methodology described in C.6 SDG&E calculated .001 faults avoided per year and .000022 ignitions avoided per year.	These inspections are new and are considered a mitigation. Fault and ignition reductions are expected to be subtracted from SDG&E's current baseline.
D.11		Patrol inspections of distribution electric lines and equipment	Yes	Direct Mitigation Activity		$ 128.3	Based on the methodology described in C.6 SDG&E calculated 35 faults avoided per year and .73 ignition avoided per year.	These inspections have been going on for years so they are a control, the assumptions is the calculated faults and ignitions would be added to SDG&E's current metrics should SDG&E stop performing the inspections
D.15		Substation inspections	Yes	Direct Mitigation Activity		$ -	SDG&E had no recorded substation ignition history in the last five years	SDG&E would probably exclude substation inspections from the WMP if it were not a requirement of the WSD template. The way SDG&E designs and constructs its substations, with the steel structures and gravel and concrete base makes it difficult for a fire to spread outside the substation. With very little ignition history, SDG&E performs substation inspection and maintenance more for the importance of substation reliability. That said, SDG&E will report on these substations, but will not have a wildfire risk reduction as there is no ignition history to reduce. SDG&E does understand the possibility of significant oil fires that could result from catastrophic transformer failures, but has many methods in place to prevent that type of failure (real time oil sampling from monitors to understand transformer health, to take action before a catastrophic failure occurs) and then reactive measures such as the industrial fire brigade which is equipped with the tools suppress an oil fire, should one occur.
E.2	**E. Vegetation management and inspection**	Detailed inspections of vegetation around distribution electric lines and equipment	Yes	Direct Mitigation Activity		$ 33,678.0	This is a control, and based on SDG&E's historical number of vegetation contacts, SDG&E subject matter experts assumed it would have 15 more ignitions annually if it were to stop performing its basic vegetation management program .	SDG&E reviewed it's historical vegetation contacts and vegetation ignitions to determine help inform the effectiveness of this control
E.5		Fuel management and reduction of "slash" from vegetation management activities	Yes	Direct Mitigation Activity		$ 810.7	SDG&E estimated the effectiveness of this mitigation at 40% based on the ratio on the height of the pole to the amount of radial clearance around the poles	SDG&E is developing ways to measure the effectiveness of fuels management. Perhaps average number and size of ignitions that originated under cleared structures or right of ways relative to # of ignitions and size of fires to ignitions started near structures where no fuels management has taken place
E.9		Other discretionary inspections of vegetation around distribution electric lines and equipment	No	Direct Mitigation Activity		This activity is embedded within a larger program which was captured in the WMP submission as initiative E.2. In 2021, this will be tracked seperately	This program was estimated to reduce 1.5 ignition per year based on subject matter expertise and historical ignition data.	SDG&E is currently studying the effectiveness of enhanced vegetation management by comparing vegetation outage rates by different post trim clearance values. SDG&E will update it's methodology to calculate the number of tree contacts reduced based on the measured data, and then utilize the vegetation contact ignition rate to calculate number of ignition reduced.
E.20		Vegetation management to achieve clearances around electric lines and equipment (Pole Brushing)	Yes	Direct Mitigation Activity		$ 2,491.4	SDG&E estimated the effectiveness of this mitigation at 40% based on the ratio on the height of the pole to the amount of radial clearance around the poles	SDG&E is developing ways to measure the effectiveness of fuels management. Perhaps average number and size of ignitions that originated under cleared structures or right of ways relative to # of ignitions and size of fires to ignitions started near structures where no fuels management has taken place
F.1	**F. Grid operations and protocols**	Automatic recloser operations	No	Direct Mitigation Activity	NA	O&M cost is not directly tracked for this activity	There are two mitigations SDG&E discusses in its recloser protocols. The first is the disabling of reclosing. This mitigation could be seen as 66% effective, as it reduces what would have been 3 faults (the original fault, and two faults for reclosing attempts) to one fault (the original fault on the electric system) or 100% effective at eliminating the two additional faults that would have occurred had reclosing been enabled. The second mitigation is the enabling of sensitive settings. This mitigation has been 100% successful thus far, but the results are not statistically significant.	To quantify the benefits, SDG&E studied all faults over the last five years to see how many were isolated by recloser devices that were disable. Based on that data 66 faults were avoided annually which equates to 1.36 ignitions avoided. For the sensitive settings, when enabled which is only on extreme FPI, 64 faults have occurred downstream of enabled devices, and of those 0 faults have led to an ignition. However comparing it to all other faults, the reduction in ignition rate from 2.08% to 0% is not significantly significant due to the small sample size, but still encouraging.
F.2		Crew-accompanying ignition prevention and suppression resources and services	Yes	Direct Mitigation Activity		$ 113.2	The effectiveness was a result of reducing consequences of wildfires and as estimated by subject matter experts	Going forward, SDG&E can calculate the reduction in consequence by running a match drop simulation of the active fire under unsuppressed conditions and then compare it to the actual result where the fire suppression crews were utilized. The difference would be the calculated reduction in consequence
F.3		Personnel work procedures and training in conditions of elevated fire risk	No	Direct Mitigation Activity		O&M cost is not directly tracked for this activity	SDG&E estimates 9.5 faults reduced and .20 ignitions avoided due to these special work procedures	This was calculated by comparing the five year average crew contacts on FPI normal days over the five year average of normal FPI days. This rate was 6.69% or 6.69 faults per 100 days under normal operations. This was compared to the crew caused fault rate under elevated conditions, where some some restrictions apply, which came out be .95% or .95 crew caused faults per 100 elevated FPI days. Finally we compared the normal day rate to the extreme FPI rate which was 0% or zero crew caused faults on extreme days period.
F.5		PSPS events and mitigation of PSPS impacts (Communication practices)	Yes	Direct Mitigation Activity	$ 1,766.3	$ 1,506.8	SDG&E assumed a 50% decrease in risk as a control for the execution of PSPS events	Going forward, SDG&E could estimate the number of ignition and the consequence of those ignitions through the post event damage patrols and match drop simulations
F.6.1		Stationed and on-call ignition prevention and suppression resources and services (Industrial Fire Brigade)	Yes	Direct Mitigation Activity		FERC	The effectiveness was a result of reducing consequences of wildfires and as estimated by subject alter experts	Going forward, SDG&E can calculate the reduction in consequence by running a match drop simulation of the active fire under unsuppressed conditions and then compare it to the actual result where the industrial fire brigade was utilized. The difference would be the calculated reduction in consequence
F.6.2		Stationed and on-call ignition prevention and suppression resources and services (Aviation Firefighting Program)	Yes	Direct Mitigation Activity		$ 3,394.7	The effectiveness was a result of reducing consequences of wildfires and as estimated by subject alter experts	SDG&E uses gallons of water dropped as a way to measure the effectiveness of this mitigation. Going forward, SDG&E can calculate the reduction in consequence by running a match drop simulation of the active fire under unsuppressed conditions and then compare it to the actual result where the air resources were utilized. The difference would be the calculated reduction in consequence
G.1	**G. Data governance**	Centralized repository for data	Yes	Foundational Supporting Risk Mitigation Activity	$ 794.0	$ -	NA	NA
G.4		Tracking and analysis of near miss data	Yes	Foundational Supporting Risk Mitigation Activity		$ 127.8	NA	NA
H.1.1	**H. Resource allocation methodology**	Allocation methodology development and application	Yes	Foundational Supporting Risk Mitigation Activity	$ 3,338.3	$ 110.7	NA	NA
H.1.2		Allocation methodology development and application - (Wildfire Mitigation Personnel)	Yes	Foundational Supporting Risk Mitigation Activity		$ 317.6	NA	NA
H.1.3		Allocation methodology development and application (PSPS Mitigation Engineering Team)	Yes	Foundational Supporting Risk Mitigation Activity		$ 585.8	NA	NA
I.1	**I. Emergency planning and preparedness**	Adequate and trained workforce for service restoration (EOC)	Yes	Direct Mitigation Activity	$ 972.3	$ 884.8	SDG&E assumed a 50% decrease in risk as a control for the execution of PSPS events	Going forward, SDG&E could estimate the number of ignition and the consequence of those ignitions through the post event damage patrols and match drop simulations

APPENDIX B
CONDITION GUIDANCE 6

Number	Category	Initiative	Tracked Separately?	Mitigation Catergory	Standard or Augmented	ii. Report required data	iii. Confirm that that there is budgeting and accounting for the activity	iv. Include a ledger of all subaccounts that show a breakdown by initiative
A.1	**A. Risk mapping and simulation**	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	Yes	Foundational Supporting Risk Mitigation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
B.1	**B. Situational awareness and forecasting**	Advanced weather monitoring and weather stations	Yes	Foundational Supporting Risk Mitigation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
B.3		Fault indicators for detecting faults on electric lines and equipment	Yes	Customer Impact Mitgation	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
B.4		Forecast of a fire risk index, fire potential index, or similar	Yes	Foundational Supporting Risk Mitigation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code & O&M cost center 100% WMP
C.1	**C. Grid design and system hardening**	Capacitor maintenance and replacement program	Yes	Direct Wildfire Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.2		Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	Yes	Direct Wildfire Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.3		Covered conductor installation	Yes	Direct Wildfire Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.6		Distribution pole replacement and reinforcement, including with composite poles	Yes	Direct Wildfire Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.7		Expulsion fuse replacement	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.8.1		Grid topology improvements to mitigate or reduce PSPS events (sectionalizing devices)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.8.2		Grid topology improvements to mitigate or reduce PSPS events (Micro Grids)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.10		Maintenance, repair, and replacement of connectors, including hotline clamps	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Hotline Clamp Internal Order Number
C.11.1		Mitigation of impact on customers and other residents affected during PSPS event (Generator Grant Program)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Expanded Gen Grant Internal Order Number
C.11.2		Mitigation of impact on customers and other residents affected during PSPS event (Whole Home Generator Program)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Combined with 11.1
C.11.3		Mitigation of impact on customers and other residents affected during PSPS event (customer resiliency programs)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Combined with 11.1
C.16		Undergrounding of electric lines and/or equipment	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code

C.17.1		Updates to grid topology to minimize risk of ignition in HFTDs (Distribution OH Hardening)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code & O&M - OH hardening Internal Order Numbers
C.17.2		Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH Hardening)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	FERC
C.17.3		Updates to grid topology to minimize risk of ignition in HFTDs (Transmission UG Hardening)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	FERC
C.17.4		Updates to grid topology to minimize risk of ignition in HFTDs (Transmission OH distribution underbuilt)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.17.5		Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Transmission OH)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	FERC
C.17.6		Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution underbuilt on Transmission OH)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.17.7		Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution OH)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.17.8		Updates to grid topology to minimize risk of ignition in HFTDs (CNF Fire hardening Distribution UG)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.18.1		Other (Lightning Arrestor Replacement Program)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
C.18.2		Other (LTE Comminication Network)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
D.1	**D. Asset management and inspections**	Detailed inspections of distribution electric lines and equipment	Yes	Direct Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Inspections Internal Order Number
D.2		Detailed inspections of transmission electric lines and equipment	Yes	Direct Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	FERC
D.4		Infrared inspections of distribution electric lines and equipment	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - IR Inspections Internal Order Number
D.6		Intrusive pole inspections	Yes	Direct Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Wood Pole Internal Order Number
D.9.1		Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (HFTD Tier 3 Inspections)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	No	O&M - The costs for this activity are embedded within D. 1. In 2021, this will be tracked seperately
D.9.2		Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone flights and assesments)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Inspections Internal Order Number
D.9.3		Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Drone Repairs)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code & O&M - Repairs Internal Order Number

D.9.4		Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations (Circuit Ownership)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code & O&M - Repairs Internal Order Number
D.11		Patrol inspections of distribution electric lines and equipment	Yes	Direct Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Internal Order Number
D.15		Substation inspections	Yes	Direct Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	Cost Center - 0% Associated with WMP
E.2	**E. Vegetation management and inspection**	Detailed inspections of vegetation around distribution electric lines and equipment	Yes	Direct Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Tree Trimming Cost Center 100% WMP
E.5		Fuel management and reduction of "slash" from vegetation management activities	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M -Fuel Management Internal Order Number
E.9		Other discretionary inspections of vegetation around distribution electric lines and equipment	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	No	O&M - Ref E. 2 - must be estimated
E.20		Vegetation management to achieve clearances around electric lines and equipment (Pole Brushing)	Yes	Direct Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Pole Brushing Internal Order Number
F.1	**F. Grid operations and protocols**	Automatic recloser operations	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	No	O&M - Multiple Cost Centers involved. Cost is not easily tracked.
F.2		Crew-accompanying ignition prevention and suppression resources and services	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Protection Teams Internal Order Number
F.3		Personnel work procedures and training in conditions of elevated fire risk	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	No	O&M - Multiple Cost Centers involved. Cost is not easily tracked.
		PSPS events and mitigation of PSPS impacts (Communication practices)	Yes		Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code & O&M - Communication Practices Internal Order Numbers
		Stationed and on-call ignition prevention and suppression resources and services (wildfire infrastructure protection teams)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Ref F. 2
		Stationed and on-call ignition prevention and suppression resources and services (Industrial Fire Brigade)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	FERC
F.6		Stationed and on-call ignition prevention and suppression resources and services (Aviation Firefighting Program)	Yes	Direct Mitgation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M - Aviation Dist Internal order number
G.1	**G. Data governance**	Centralized repository for data	Yes		Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code
G.4		Tracking and analysis of near miss data	Yes	Foundational Supporting Risk Mitigation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M Ignition Management internal order number

H.1.1	**H. Resource allocation methodology**	Allocation methodology development and application	Yes	Foundational Supporting Risk Mitigation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code and O&M Cost Center 100% WMP
H.1.2		Allocation methodology development and applicationr - (Wildfire Mitigation Personnel)	Yes	Foundational Supporting Risk Mitigation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M Cost Center 100% WMP
H.1.3		Allocation methodology development and application (PSPS Mitigation Engineering Team)	Yes	Foundational Supporting Risk Mitigation Activity	Augmented	Required data was reported in the WMP and in general guidance 1-7	Yes	O&M Cost Center 100% WMP
I.1	**I. Emergency planning and preparedness**	Adequate and trained workforce for service restoration (EOC)	Yes	Direct Mitgation Activity	Standard	Required data was reported in the WMP and in general guidance 1-7	Yes	Capital Budget Code and O&M cost center 50% WMP

APPENDIX C
CONDITION GUIDANCE 10

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(submitted via KiteWorks to the WSD)

APPENDIX D
CONDITION GUIDANCE 10

submitted in Excel Format, see separate file

APPENDIX E
CONDITION SDGE-1 and SDGE-2

Milage and Customer Data					
	Total OH Miles (T&D)	Total Customers	%OH to UG	OH Customers (calculated)	OH customers/ OH circuit Mile (Customer Density)
SDG&E	8300	3,600,000	51%	1836000	221
PG&E	99000	16,000,000	84%	13440000	136
SCE	52300	15,000,000	62%	9300000	178

Balloon Contacts (T&D totals from table 11)						
	2015	2016	2017	2018	2019	Average
SDG&E	87	109	144	138	101	115.8
PG&E	523	567	648	673	528	587.8
SCE	824	898	1088	1052	909	954.2

Ballon Contacts per 1000 circuit miles						
	2015	2016	2017	2018	2019	Average
SDG&E	10.5	13.1	17.3	16.6	12.2	14.0
PG&E	5.3	5.7	6.5	6.8	5.3	5.9
SCE	15.8	17.2	20.8	20.1	17.4	18.2

Balloon Contacts per 1000 circuit miles per OH customer density						
	2015	2016	2017	2018	2019	Average
SDG&E	0.05	0.06	0.08	0.08	0.06	0.06
PG&E	0.04	0.04	0.05	0.05	0.04	0.04
SCE	0.09	0.10	0.12	0.11	0.10	0.10

Balloon Ignitions (T&D totals from table 11)						
	2015	2016	2017	2018	2019	Average
SDG&E	3	3	6	8	1	4.2
PG&E	20	14	11	16	14	15
SCE	13	11	20	30	15	17.8

Ballon Ignitions per 1000 circuit miles						
	2015	2016	2017	2018	2019	Average
SDG&E	0.4	0.4	0.7	1.0	0.1	0.5
PG&E	0.2	0.1	0.1	0.2	0.1	0.2
SCE	0.2	0.2	0.4	0.6	0.3	0.3

Balloon Ignitions per 1000 circuit miles per OH customer density						
	2015	2016	2017	2018	2019	Average
SDG&E	0.0016	0.0016	0.0033	0.0044	0.0005	0.0023
PG&E	0.0015	0.0010	0.0008	0.0012	0.0010	0.0011
SCE	0.0014	0.0012	0.0022	0.0032	0.0016	0.0019

Number of Incidents - Distribution - SDG&E						
Balloon Contact	**71**	**84**	**120**	**112**	**93**	**96**
Non-HFTD	65	78	110	97	79	85.8
Tier 2	2	2	8	7	7	5.2
Tier 3	3	4	2	8	7	4.8
Unknown	1	0	0	0	0	0.2

Distribution OH Miles	
None HFTD	2992
Tier 2	1822
Tier 3	1656
Total	**6470**

Balloon Contacts Per 1000 miles	
None HFTD	28.7
Tier 2	2.9
Tier 3	2.9
Total	**14.8**

Milage and Customer Data					
	Total OH Miles (T&D)	Total Customers	%OH to UG	OH Customers (calculated)	OH customers/ OH circuit Mile (Customer Density)
SDG&E	8300	3,600,000	51%	1836000	221
PG&E	99000	16,000,000	84%	13440000	136
SCE	52300	15,000,000	62%	9300000	178

Vehicle Contacts (T&D totals from table 11)						
	2015	2016	2017	2018	2019	Average
SDG&E	204	201	213	219	223	212
PG&E	1820	2070	1955	1952	1860	1931.4
SCE	687	762	698	830	804	756.2

Vehicle Contacts per 1000 circuit miles						
	2015	2016	2017	2018	2019	Average
SDG&E	24.6	24.2	25.7	26.4	26.9	25.5
PG&E	18.4	20.9	19.7	19.7	18.8	19.5
SCE	13.1	14.6	13.3	15.9	15.4	14.5

Vehicle Contacts per 1000 circuit miles per OH customer density						
	2015	2016	2017	2018	2019	Average
SDG&E	0.11	0.11	0.12	0.12	0.12	0.12
PG&E	0.14	0.15	0.15	0.15	0.14	0.14
SCE	0.07	0.08	0.08	0.09	0.09	0.08

Vehicle Ignitions (T&D totals from table 11)						
	2015	2016	2017	2018	2019	Average
SDG&E	6	4	4	3	3	4
PG&E	47	35	54	48	41	45
SCE	12	7	6	13	11	9.8

Vehicle Ignitions per 1000 circuit miles						
	2015	2016	2017	2018	2019	Average
SDG&E	0.7	0.5	0.5	0.4	0.4	0.5
PG&E	0.5	0.4	0.5	0.5	0.4	0.5
SCE	0.2	0.1	0.1	0.2	0.2	0.2

Vehicle Ignitions per 1000 circuit miles per OH customer density						
	2015	2016	2017	2018	2019	Average
SDG&E	0.0033	0.0022	0.0022	0.0016	0.0016	0.0022
PG&E	0.0035	0.0026	0.0040	0.0036	0.0031	0.0033
SCE	0.0013	0.0008	0.0006	0.0014	0.0012	0.0011

Number of Incidents - Distribution SDG&E						
Vehicle Contact	**203**	**199**	**212**	**215**	**223**	**210.4**
Non-HFTD	161	159	180	178	193	174.2
Tier 2	27	23	21	24	20	23
Tier 3	14	11	9	13	10	11.4
Unknown	1	6	2	0	0	1.8

Distribution OH Miles	
None HFTD	2992
Tier 2	1822
Tier 3	1656
Total	6470

Vehicle Contacts Per 1000 miles	
None HFTD	58.2
Tier 2	12.6
Tier 3	6.9
Total	32.5

APPENDIX F
CONDITION SDGE-6

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(submitted via KiteWorks to the WSD)

APPENDIX G
CONDITION SDGE-11

SDGE A Sempra Energy utility	DEPARTMENT SUBSTATION ENGINEERING, PROTECTION, AND DESIGN	DIVISION ELECTRIC TRANSMISSION AND DISTRIBUTION	DOCUMENT SECURITY INTERNAL
	SUBJECT SUBSTATION ENGINEERING STANDARDS		EFFECTIVE DATE 03/14/2014
SUBSTATION LANDSCAPING			DOCUMENT NUMBER **SES-5103**

1. PURPOSE

The purpose of this Substation Engineering Standard (SES) is list guidelines for physical placement and/or installation of landscaping surrounding a San Diego Gas & Electric (SDG&E) electrical substation. (SDG&E). These landscaping requirements will be used in the design of SDG&E substations. In all cases, this SES only applies to new substation designs issued for construction after the most recent revision of this standard. Designs of existing installations will be revised on an as-needed basis. All deviations from this SES shall be approved by the Substation Engineering and Design Manager.

1.1. The primary purpose of a substation is power delivery; therefore all landscaping must not interfere with this purpose. Any landscaping that interferes with this purpose shall be removed.

1.2. This standard is meant as a guideline to ensure the security and safety of SDG&E's substations; however CPUC permitting and/or City requirements may dictate that these guidelines may be varied slightly.

2. REFERENCE

2.1. SDS-S-500 drawings (ultimate substation layouts)

2.2. SES-5102 Substation Layout Requirements

3. DEFINITIONS

3.1. CSE – Civil/Structural Engineering, SDG&E internal section.

3.2. SED – Substation Engineering and Design, SDG&E internal section.

3.3. LPNR – Land Planning and Natural Resources.

4. GENERAL

4.1. Landscaping

4.1.1. The landscaping plan must take into account the layout of the substation, transmission and distribution ingress and egress, and permitting requirements.

4.1.2. Landscaping must not interfere with any electrical equipment, entry/exits of the substation, and any safety requirements (signs, climbing restrictions, fence/wall maintenance)

4.1.3. All landscaping plans must be approved by CSE, SED and Land Services.

4.2. General Placement

4.2.1. A minimum 15ft allowance from the property line to the substation wall/fence is required to allow for wall/fence maintenance.

4.2.2. No tree trunks should be closer than 15ft to the wall (20ft when distribution manholes are present) and will not have any part of the mature canopy overhanging the wall/fence.

4.2.3. No tree trunks shall be placed closer than 10ft to the driveways to eliminate any branches interfering with equipment or emergency vehicles entering the site.

4.2.4. No climbing vines should be installed on substation walls, this is to prevent blockage of DANGER signs and to eliminate a possible climbing hazard.

4.2.5. No plantings with deep roots shall be placed over transmission or distribution conduit locations and root barrier cloth will be installed around any conduit locations.

4.2.6. All electric manholes located on exterior substation property shall be accessible by vehicles and have the required work space surrounding it.

4.2.7. No trees shall be planted to allow the mature canopy to come within 5ft horizontally of power lines.

4.2.8. If landscaping is planted near or on structural retaining walls – all landscape material must be approved by CSE, SED and Land Services.

4.2.9. Landscape material shall not be planted next to driveways if the roots will damage the driveways.

4.2.10. Root barrier materials shall be incorporated in proximity to concrete sidewalks and driveways.

4.3. Landscape Material

4.3.1. All landscape material should be drought tolerant, fire resistant, low maintenance and sustainable upon maturity.

4.3.2. Any tree shall have a minimal branching and root system.

4.3.3. Landscaping should be consistent with the existing community plan whenever possible.

4.3.4. Landscape material shall be designed so that it does not obscure the substation fence or wall. This helps eliminate loitering, and/or living outside the substation.

4.4. Landscape Irrigation

4.4.1. The electric service for the irrigation time clock(s) shall come from a 120V breaker on the AC panel in the control shelter (or an AC panel in the yard).

4.4.2. The service shall be fed by 2" conduit to the location of the time clock(s).

4.4.3. The irrigation water supply shall be metered and come from a City approved tap or well if necessary. This may or may not be from a recycled water supply.

4.4.4. Irrigation will be per the approved landscape plan.

4.4.5. Two sleeves (4" conduit, schedule 80) shall be placed under the outside driveways/sidewalks for the purpose of continuous irrigation piping and valve wiring.

5. ATTACHMENTS

LPNR Approved Plant list

Revision History:

Effective Date	Changes Made	By
03/14/14	New Issue	SCC

Titles	Name	Date
AUTHORED BY: Team Lead Capital Projects, SED	[redacted]	3/17/14
REVIEWED BY: Landscape Contr Administrator Corp Real Estate & Planning		3-18-14
REVIEWED BY: Principal Engineer, SED		3-7-14
REVIEWED BY: Team Lead, CSE		3/17/14
APPROVED BY: Apparatus & Standards, SED		3.7.14
APPROVED BY: Manager, SED		3/7/14

San Diego Gas Electric / Sempra
Energy Utilities Approved Plant List
Appendix C Revision 1 SDGE-11

The following plant list represents a core group of plant materials to be used at most SDG&E / Sempra installations involving Substations, Gas Reg. Stations, etc. This list was assembled with the following criteria:

Most plant material should be evergreen, drought tolerant, durable, pest & disease resistant, cold hardy & aesthetically attractive. Additionally the plants should have good growth habits & be low water requiring. Designs for other projects including Offices / O&M Centers should use a more refined plant palette, appropriate for the specific condition. Consult the Sunset Western Garden Book to verify plant usage & water / sun exposure requirements. Other planting conditions such as "Rights of Way" have planting special requirements including maximum tree height. A list of separate "Rights of Way" planting requirements take precedent in the final plant

Plant Type	Botanical Name	Common Name	Height	Spread	Notable Characteristics	Growth Rate	Water Req.
Tall Screen Trees, 40' - 60'+	Cedrus deodora	Incense Cedar	40'-70'	30'-40'	Blue/Green 1 to 2" sharp pointed needles, Pyramidal shape	Moderate	Ornamental
	**Eucalyptus polyanthemos	Silver Dollar Gum	20'-60'	20'	Gray/Green Foliage, tall, graceful	Fast	Naturalized
See Note Below	**Eucalyptus sideroxlyon	Red Iron Bark	20'-80'	20'	Screen tree, coastal or inland	Fast	Naturalized
	**Pinus canariensis	Canary Island Pine	60'	20'	Long needles, graceful structure, tall screening tree	Moderate	Ornamental
	**Pinus eldarica	Mondel Pine	30'-80'	30'	Dense, christmas tree-like	Fast	Naturalized
	Quercus ilex	Holly Oak	40'-70'	40'	Dense, dark gray/green foliage	Moderate	Naturalized
	Quercus suber	Cork Oak	70'-100'	70'	Cork-like bark, soil & heat tolerant	Moderate	Naturalized
	**Taxodium macronatum	Montezuma Cypress	40'-75'	30'	Redwood-like, fine texture	Fast	Ornamental
	Tristania conferta	Brisbane Box	30'-60'	20'	Upright, soil tolerant, reddish brown. bark	Fast	Ornamental
Medium Trees, 25' - 40'	Brachychiton populneus	Bottle Tree	30'-50'	30'	Heavy tapering trunk, aspen-like leaves	Moderate	Naturalized
	Cinnamomum camphora	Camphor Tree	to 50'	50'	Leaves change from bronze to green to yellow	Slow	Ornamental
	Eucalyptus ficifolia	Red Flowering Gum	to 40'	30'	Red flowers, clean attractive Euc. Best at coast	Moderate	Naturalized
	Eucalyptus nicholii	Willow-Leafed Peppermint	to 40'	20'	Deeply fissured reddish brown bark, billowy	Moderate	Naturalized
	Rhus lancea	African Sumac	25'-30'	25'	Bright green new foliage, long leaves, hardy & tough	Moderate	Naturalized
	**Schinus molle	California Pepper	25'-40'	40'	Gnarled trunk, soil tolerant, messy leaf litter	Fast	Native
Small Trees, 10' - 25'	Arbutus unedo std.	Strawberry Tree (Tree Form)	8'-35'	20'	Beautiful small evergreen tree or shrub with reddish small fruit	Moderate	Naturalized
	Eucalyptus lehmannii	Bushy Yate	20'-30'	20'	Good screen, dense leafed, clean street tree	Fast	Naturalized
	Eriobotrya deflexa	Bronze Loquat	15'-30'	25'	Bronzy new grow, serrated leaves,	Moderate	Ornamental
	Geijera parviflora	Australian Willow	25'-30'	25'	Willowy fine texture, clean, street tree	Moderate	Naturalized
	Ilex x altaclerensis 'Wilsonii" std.	Wilson Holly (Tree Form)	to 15'	10'	Small Dark Green Holly leafed tree, clean, hardy	Moderate	Ornamental
	Laurus nobilis saratoga	Sweet Bay	15'-40'	25'	Dark Green leaves, erect growth, clean	Slow	Ornamental
	Leptospermum petersonii	Australian Tea Tree	20'-30'	20'	Fine texture, fissured bark, needs good drainage	Slow	Naturalized
	Ligustrum lucidum	Glossy Privet	3'-12'	10'	Medium green shiny foliate, compact dense growth	Moderate	Ornamental
	Magnolia grandiforla St. Marys	St Marys Magnolia	to 20'	10	Large shiny leaf, bronze underside, showy flowers	Moderate	Ornamental
	Metrosideros excelsus	New Zealand Christmas Tree	to 25'	20'	Gray/green foliage, red flowers, dense growth	Moderate	Naturalized
	Photinia fraseri std.	Photinia (Tree Form)	10'-15'	15'	Red color on new growth, small flowers, dense clean tree	Moderate	Ornamental
	Pittosporum undulatum std.	Victorian Box (Tree Form)	20'-30'	20	White, pleasantly fragrant flowers spring and early summer.	Moderate	Ornamental
	Prunus caroliniana	Carolina Cherry	to 20'	15'	Medium green shiny foliate, compact dense growth	Moderate	Ornamental
	Rhus lancea	African Sumac	15'-30'	25'	Drought / heat tolerant, spreading, open branching	Slow	Naturalized
	Stenocarpus sinuatus	Firewheel Tree	to 30'	15'	Bright Red Flowers, no pests, dark shiny leaves	Slow	Ornamental
	Tristania laurina	NCN	to 20'	5'	Dense, round headed tree, small flowers	Slow	Ornamental
Large Shrubs, 8'+	Arbutus unedo	Strawberry Tree (Shrub Form)	8'-35'	20'	Dark green, handsome leaves, red stemmed	Moderate	Naturalized
	Heteromeles arbutifolia	Toyon	6'-10'	6'	Thick glossy leaves, California native shrub	Moderate	Native
	Leptospermum laevigatum	Australian Tea Tree	to 30'	20'	Gnarly, twisted branching, deep fissured bark	Slow	Naturalized
	Melaleuca nesophila	Pink Melaleuca	15'-20'	20'	Soil tolerant, pink flowers, likes heat	Fast	Naturalized
	Nerium oleander	NCN	varies	varies	Large scale shrub with coarse texture. Tough plant with color	Fast	Naturalized
	Photinia fraseri	Photina (Shrub Form)	10'-15'	15'	Reddish new growth, white flowers	Fast	Ornamental
	Raphiolepis ind. Majestic Beauty	Indian Hawthorne	15'	15'	Pink flowers, clean, prunable	Moderate	Ornamental
Medium Shrubs, 4' - 8'	Arbutus unedo compacta	Compact Strawberry Tree	5'max.	3'	Dark green, handsome leaves, red stemmed	Moderate	Naturalized
	Ceanothus sp.	Wild Lilac	varies	varies	Native plant that naturalizes, nice dark leaf color, purple flow.	Moderate	Native
	Coleonema pulchrum	Pink Breath of Heaven	5'	4'	Billowy growth with native look, med green, pink flowers	Moderate	Ornamental
	Cotoneaster parneyi	NCN	8'	8'	Graceful, arching habit, red berries, clustered white flowers	Moderate	Naturalized
	Dodonea viscosa	Hopseed Bush	8'	4'	Green or Burgundy colored leaves, upright growth habit	Moderate	Naturalized
	Grevillea noelii	NCN	4'	4'-5'	Pine needle like growth, pink & white flowers	Moderate	Naturalized
	Grewia occidentalis	Lavender Starflower	6'	5'	Deep green leaves, lavender flowers, loves sunlight	Moderate	Ornamental
	Ilex cornuta / vomitoria	Holly (sp.)	varies	varies	Dark green foliage, good barrier plant	Moderate	Ornamental
	Leptospermum scoparium	New Zealand Tea Tree	3'-8'	4'	Size depends on variety, colorful flowers, rugged	Moderate	Naturalized
	Phormium tenax 'Atropurpurea'	New Zealand Flax	3'-5'	5'	Purplish bladed leaves, drought tolerant	Moderate	Naturalized
	Raphiolepis indica varieties	India Hawthorne	3'-5'	5'	Varieties include Clara, Pinkie, Jack Evans, Ballerina	Moderate	Ornamental
	Rhamnus californica	Coffeeberry	3'-15'	5'	Native appearance, drought tolerant,	Slow	Native
	Rhus integrifolia	Lemonade Berry	3'-10'	8'	Native California shrub, tolerant of variety of conditions	Moderate	Native
	Rhus ovata	Sugarbush	2'-10'	8'	Good slope plant, glossy leathery leaves, white / pink flowers	Moderate	Native
	Viburnum tinus 'Spring Boquet'	NCN	6'	4'	Compact form, dense green leaves, ornamental, pink flowers	Moderate	Ornamental
Small Shrubs, 1' - 3'	Baccharis pilularis 'Twin Peaks'	Coyote Bush	2'-3'	3'	Low prostrate groundcover, native look, grows everywhere	Moderate	Native
	Cassia coquiembensis	Chilean Senna	3'-4'	3'-6'	Drought & soil tolerant, native appearance, yellow flowers	Moderate	Native
	Hemerocalis sp.	Day Lilly	1'-3'	4'	Various colors, grassy bladed leaves	Moderate	Ornamental
	Lavandula sp.	Lavender	3'	3'	Low water requirements, nice flowers, grayish leaves	Moderate	Naturalized
	Limomium perezii	Sea Lavender	3'	3'	Tolerate heat and varying soils	Moderate	Naturalized
	Pittosporum tob. Wheeleri	Wheelers Dwarf Pittosporum	1'-2'	2'	Low Boundary plant, dense growing	Fast	Ornamental
Groundcover, 6" - 2'	Acacia redolens 'Desert Carpet'	NCN	1'	5'	Prostrate, drought tolerant version of redolens	Moderate	Native
	Ceanothus griseus horizontalis	Carmel Creeper	1'-2'	5'	Drought tolerant, purple flower, dark green leaves	Moderate	Native
	Cistus corsicus	Rockrose	1'-3'	5'-7'	Dense mounding spready shrub, drought tolerant	Moderate	Native
	Gazania (Clumping or Trailing)	NCN	6"	varies	Green or gray/green leaves with vivid flowers, yellow to red	Moderate	Ornamental
	Ice Plant						
	Carpobrotus edulis	Pickleweed	1'	7'	Great slope plant for large areas, quickly established	Fast	Native
	Lampranthus productus	NCN	15"	2'	Clumping form with gray green leaves, intense color	Fast	Naturalized
	Osteospermum	African Daisy	1'	7'	Naturalized plant, requires little water, great flowers	Fast	Naturalized
	Myoporum pacificum	NCN	2'	30'	Dark Green color, drought tolerant once established	Super Fast	Naturalized
	Myoporum parvifolium	Pink Myoporum	3"	9'	Trailing groundcover with small pink flowers in spring	Moderate	Ornamental
	Vinca	Periwinkle	1'-2'	5'+	Trailing plant with dark green leaves & purple flowers	Fast	Ornamental
Vines / Espaliers	Ficus pumila	Creeping Fig	6"	20'+	Dark green leaves, aggressive growth, attaches to surfaces	Fast	Ornamental
	Parthenocissus quinquefolia	Virginia Creeper	6"	20'+	Deciduous, colorful fall color, attaches to surfaces	Fast	Ornamental
	Photinia fraseri esp.	NCN	6'	20'+	Evergreen, new growth color, does not attach to wall surfaces	Fast	Ornamental

Water Requirements:

The **Water Req.** column identifies a **Water Requirement / Use Category** for each plant listed. The category definitions are as follows:

Native	Plants that require water when initially planted but prefer little to no water once established.
Naturalized	Plants with a more refined character requiring regular water to get established and decreasing amounts when mature. Period water in summer months as needed.
Ornamental	Plants with a refined quality requiring regular water to maintain healthy appearance. Most on this list are drought tolerant, meaning they can survive on little water for periods of time.

**** Note****

This Plant Material should not be used under overhead power lines or within close proximity to Substations, Gas Regulators or other facilities where tall growth or wind conditions could result in tree litter, heavy branch or fallen tree damage to the facility.