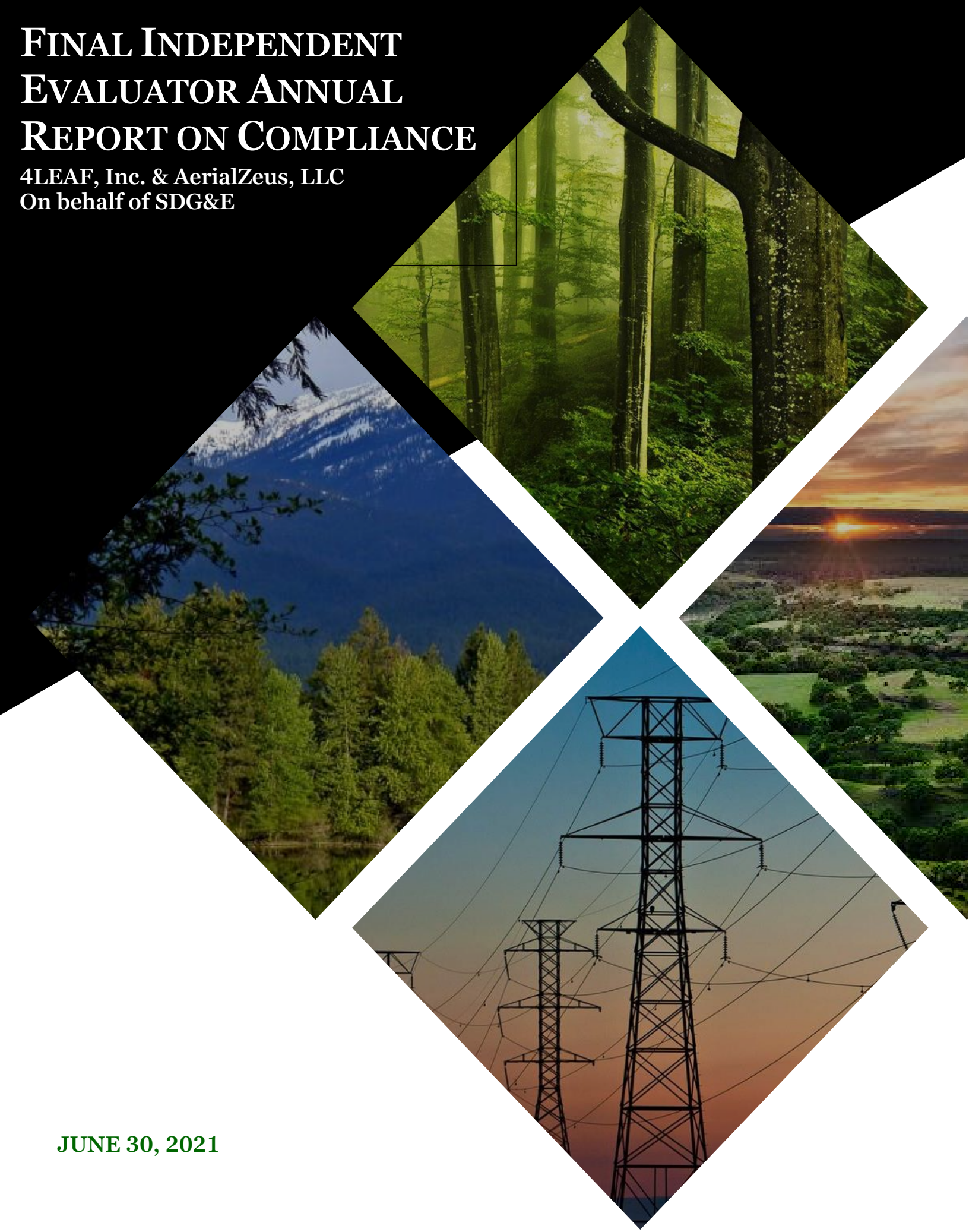
Final Independent Evaluator Annual Report on Compliance

4LEAF, Inc. & AerialZeus, LLC
On behalf of SDG&E



JUNE 30, 2021

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1. Executive Summary

The Executive Summary should contain key takeaways from the Independent Evaluator's evaluation, including key findings from the Independent Evaluator's audit of WMP activity completion, verification of funding, and verification of QA/QC programs.

In an effort to provide California residents with safe and reliable energy, Independent Evaluators (IE) 4LEAF, Inc. (4LEAF) and AerialZeus, LLC (AerialZeus), have been engaged to provide auditing, inspection, and evaluation services in review of San Diego Gas & Electric's (SDG&E) 2020 Wildfire Mitigation Plan (WMP) on behalf of the citizens of California and the California Public Utilities Commission's (CPUC) Wildfire Safety Division (WSD).

To keep Californians safe from wildfires caused by ignition from electrical infrastructure, our team has performed a comprehensive review and evaluation of activities by SDG&E in compliance with their 2020 WMP. In preparation of this IE report, our efforts have been concentrated in the following areas:

- Verifying compliance with SDG&E's 2020 WMP
- Validating QA/QC programs
- Determining the actual funding of activities for SDG&E's 2020 WMP

Due to the compressed nature of time on drafting this report, inspecting, and auditing SDG&E's complex infrastructure has been limited. However, our team has focused on some of the most impactful initiatives and programs that SDG&E has deployed as part of its 2020 WMP. Our teams have taken a top-down approach by analyzing SDG&E's expenditures, and a bottom-up analysis by performing verifiable field inspections. Therefore, it is our intention to provide an objective perspective of our findings and present recommendations that are meant to safeguard lives and protect infrastructure.

Some methodologies presented in this report might be new to the power Industry. Our implementation of these approaches in this setting demonstrates the significant value that can be captured in utility applications, as well as their previously proven scientific contributions in an ever-changing climate environment.

The use of aerial intelligence to validate SDG&E's location and accounting of its own assets is a specific and critical case in point. For instance, our field crews found discrepancies with the precise placement of poles and the inventory of electrical equipment on top of such poles. Vegetation Management constituted 84% of SDG&E's WMP activities in 2020, primarily in its Northeast and Eastern Districts which accounted for 60% of all Vegetation Management activities. We found that multispectral satellite imagery could improve SDG&E's Vegetation Management efforts by identifying high biofuel regions that could have a larger impact on the safety of many populations throughout its territory.

Last, there were 81,555 activities reported by SDG&E, as a compilation of all their Work Orders for the year 2020. Our team discovered that one asset could have multiple Work Orders assigned to it, under the same activity. We found that such methodology could lead to miscounting, knowing or unknowingly, the

actual work performed by SDG&E's employees and subcontractors. Despite the relatively small number of field inspections our team performed, 392 in total, our team discovered that 1.9% of the Poles structures inspected need replacement. Also, 12 out of 16 inspected SCADA showed significant Vegetation Encroachment.

It is important to emphasize that these observations constitute only a small percentage of SDG&E's vast infrastructure, and anyone reading this report should use caution in extrapolating these findings.

2. Introduction

The Introduction should contain upfront context and a high-level summary of the work performed by the Independent Evaluator.

Electrical infrastructure and equipment pose ongoing risks of wildfire ignition due to the presence of electrical currents and proximity to combustible surfaces. SDG&E's 2020 WMP [1] contains the electrical corporation's detailed plans to reduce the risk of its electrical equipment potentially igniting a wildfire. The central elements of the WMP address activities in system hardening [2], vegetation management, new inspection programs, and "situational awareness" (weather stations, high definitions cameras, wind data, computer modeling etc.) [3]

Electrical corporations are also required to demonstrate, through evaluation of a wildfire mitigation measure's "risk-spend efficiency," that California electric ratepayers' funds are only being spent on mitigation measures that are effective in reducing utility-caused wildfire risk. [4]

SDG&E's 2020 WMP was submitted to the CPUC. It consists of programs and activities that fall under three main categories:

- Operations and Engineering – Actions to build, maintain and operate the SDG&E electric system in a manner to realize high levels of fire safety;
- Situational Awareness and Weather Technology – Actions that focus on improving SDG&E's ability to monitor and understand the environment in which fires ignite and spread; and
- Customer Outreach and Education – Actions that continue and/or build on SDG&E's communication and collaboration with regional stakeholders and customers.

Following the CPUC's WMP guidelines, SDG&E organized its WMP into 10 categories. In order to follow the plan's informational structure and to effectively audit and inspect SDG&E's WMP 2020 compliance, the IE team of 4LEAF and AerialZeus has focused their efforts on all 10 of the following categories:

1. Risk Assessment and Mapping
2. Situational Awareness and Forecasting
3. Grid Design and System Hardening
4. Asset Management and Inspections
5. Vegetation Management and Inspections
6. Grid Operations and Protocols
7. Data Governance

8. Resource Allocation Methodology
9. Emergency Planning and Preparedness
10. Stakeholder Cooperation and Community Engagement

The IE team used two main sources of data for the compliance inspection of the SDG&E WMP 2020:

- Data provided by SDG&E; and
- Data collected and information produced by IE.

Detailed information on all data sources used by the IE team is presented in Table 1.

Table 1: Summary of Sources Utilized

#	Data	Data Detail	Data Type	Source
1	2020 Wildfire Mitigation Plan	SDG&E 2020 Wildfire Mitigation Plan Revised 03-02-2020	PDF	SDG&E
		Appendix A - WMP Tables 1-31 Revised 03-10-2020 highlighted	MS Excel spreadsheet	SDG&E
2	2021 Wildfire Mitigation Plan	SDG&E 2021 WMP Update 02-05-2021	PDF	SDG&E
		Attachment B - WMP Tables 1-12 Revised 3-4-21	MS Excel spreadsheet	SDG&E
3	Quarterly Initiative Update	2021.04.01.QUI	MS Excel spreadsheet	SDG&E
		2021 WMP Program List - Quant and Qual targets and quarterly progress	MS Excel spreadsheet	SDG&E
4	Quarterly Advice Letters	SDG&E Quarterly Advice Letters 2020Q1	PDF	SDG&E
		SDG&E Quarterly Advice Letters 2020Q2	PDF	SDG&E
		SDG&E Quarterly Advice Letters 2020Q3	PDF	SDG&E
		SDG&E Quarterly Advice Letters 2020Q4	PDF	SDG&E
5	Remedial Compliance Plan	SDGE WMP Remedial Compliance Plan 07-27-2020 (R.18-10-007)	PDF	SDG&E
6	Annual Compliance Report	2020 SDGE WMP Compliance Report 04-01-2021	MS Word Document	SDG&E
7	Quarterly Data	20210205_SDGE_QDR_JW	Geo	SDG&E

	Report		Database	
		WSD_SourceDataAnalysis_Feb21v5	MS Excel Spreadsheet	*SDG&E*
8	Compliance Reports, Completed 2020 Work	Inspection_Tracking_for_WSD_SystemHardening_2020	MS Excel Spreadsheet	*SDG&E*
		Inspection_Tracking_for_WSD_SystemHardening_EnVeg_Mgmt_2020	MS Excel Spreadsheet	*SDG&E*
9	Satellite Imagery	Multispectral satellite imagery from SENTINEL-2 at 10-meter/pixel resolution collected on 5/30/2021	Multispectral Images	*IE*
10	Satellite Imagery	Multispectral satellite imagery from SENTINEL-2 at 10-meter/pixel resolution collected on 9/22/2020	Multispectral Images	*IE*
11	NDVI Map	Normalized Difference Vegetation Index map 5/30/2021	Geotiff	*IE*
12	NDVI Map	Normalized Difference Vegetation Index map 9/22/2020	Geotiff	*IE*
13	Field Inspection Reports	SDGE Inspection Reports	*PDF*	*IE*
14	Financial Reports	WMP Financial Results_2020-12.xls	MS Excel Spreadsheet	SDG&E
15	Financial Reports	WMP Capital Project Detail.xls	MS Excel Spreadsheet	SDG&E
16	Communications	Wildfire Safety 2020 Wrap Up Report.pdf	PDF	SDG&E
17	Communications	PSPS 2020 Wrap Up.pdf	PDF	SDG&E
18	Communications	2020 Summary of Customer Research_Effectiveness Metrics.pdf	PDF	SDG&E
19	Communications	2020 YE Summary WFS Communications and Outreach.pdf	PDF	SDG&E
20	Emergency Planning	EOC Responder Training Statistics for WMP assessment 06282021.pdf	PDF	SDG&E

21	Emergency Planning	SDGE Partner Engagement for WMP assessment 06282021.pdf	PDF	SDG&E
22	Emergency Planning	Mutual Assistance Plan Final with Signature 09302020.pdf	PDF	SDG&E
23	Program	Apollo 2 Final Exec Readout_080620_notes.pptx	PPTX	SDG&E
24	Program	Apollo Proposed Scope.pptx	PPTX	SDG&E
25	Program	Copy of Outage Heat Form_Template.xlsx	MS Excel Spreadsheet	SDG&E
26	Program	Morning Report to SDGE Service Disp (2021-06-08) C.docx	Word Document	SDG&E
27	Program	SP11-2020 IP CONOPS.docx	Word Document	SDG&E

The activities presented in this documentation, either as planned and/or performed by SDG&E, are further subdivided into four categories based on the nature, amount of performed work, and the nature of the verification activities required to confirm the extent and quality of the work carried out.

The four categories are:

- Large volume (≥100 units) + quantifiable goal/target + field verifiable WMP activities
- Large volume (≥100 units) + quantifiable goal/target + non-field verifiable WMP activities
- Small volume (<100 units) + quantifiable goal/target WMP activities
- Qualitative goal/target WMP activities

Each of these categories are discussed separately in the sections that follow. A list of the specific WMP activities in each category is included at the start of each section.

As a final note, operating assumptions made by the IE team in performance of this work include:

- Wildfire mitigation is an extremely high priority to the State of California, the CPUC, the Power Utilities and their staff, and all Californians;
- Evaluation activities will conform to the Scope of Work contracted between the CPUC and 4LEAF/AerialZeus;
- The activities were conducted from June 1-15, 2021, with a focus on SDG&E's 2020 WMP activity completion;
- The snapshot of SDG&E's WMP performance, gathered in this short period was only partial, in light of SDG&E's 2020 WMP complexity and reporting schedule; and
- Performance insights gathered by the IE team, not reflected in this report, will form the foundation for constructive work with SDG&E during the balance of this engagement.

3. Independent Evaluator Review of Compliance

The Independent Evaluator Review of Compliance section is for the Independent Evaluator to provide an overview of its process for review and assessment of the electrical corporation's compliance with its Wildfire Mitigation Plan (WMP).

In the sections below, provide a review of the electrical corporation's WMP activity completion, verification of funding and verification of QA/QC programs.

3.1 WMP Activity Completion

The WMP Activity Completion section should detail the Independent Evaluator's review and verification of compliance for all WMP activities that have specific quantifiable or qualitative performance goals/targets set forth in the electrical corporation's 2020 WMP.

SDG&E's 2020 WMP activities have been broken out into four categories:

1. Large volume (≥100 units) + quantifiable goal/target + field verifiable WMP activities
2. Large volume (≥100 units) + quantifiable goal/target + non-field verifiable WMP activities
3. Small volume (<100 units) + quantifiable goal/target WMP activities
4. Qualitative goal/target WMP activities

The WSD expects Independent Evaluators to assess compliance via multiple dimensions, including work completion, work quality, and adherence to applicable protocols and procedures. For Field Verifiable WMP activities, the Independent Evaluator must verify work quality in addition to completion of initiative installation and adherence to applicable protocols and procedures. For all other WMP activities, the Independent Evaluator must verify initiative installation and adherence to applicable protocols and procedures.

As previously mentioned, for the sake of efficacy, our teams have taken a top-down approach by analyzing SDG&E's expenditures, and a bottom-up analysis by performing verifiable field inspections. Furthermore, the selection of the quantifiable + field verifiable goals/targets were determined by reviewing SDG&E's Work Orders, their GPS location in relation to the CPUC's High Fire Threat District, Tiers 2 & 3, and Multispectral Satellite imagery.

3.1.1 — Sampling Methodology and Discussion

In this section, the Independent Evaluator should describe its sampling methodology, the samples that were chosen, and areas of focus. The Independent Evaluator may include the samples that were chosen in the Appendix instead of this section.

The Independent Evaluator should also include a discussion of how results of the sampled assessment are indicative of the electrical corporation's broader implementation of WMP initiatives, to give the WSD an understanding of the process the Independent Evaluator used to estimate full completion.

The following sections describe methodologies used by the IE in developing the samples used in verification of WMP activities. While sampling was applied primarily to activities classified as "Large Quantitative Field Verifiable," we also addressed the sampling methodology applied for the Qualitative activities in section 3.1.1.2.

NDVI map and SDG&E distribution and transmission grids were overlapped and AOI's were selected based on following criteria:

- Existence of distribution grid or transmission grid
- Values of NDVI higher than 0.6
- Values of NDMI Lower than 0.6
- Presence of areas inspected by SDG&E - for areas evaluation of inspected areas
- Absence of areas inspected by SDG&E - for areas evaluation of not inspected areas

Therefore, the team identified AOIs as follows:

- 2 locations where ignitions were reported by SDG&E
- 15 locations for Transmission Lines
- 50 locations for Distribution Lines (25-reported by SDG&E for Vegetation Management and 25 randomly selected from the previously defined criteria)

The following sections describe methodologies used by the IE in developing the samples used in verification of SDG&E's WMP activities. While sampling was applied primarily to activities classified as "Large Quantitative Field- Verifiable," we also addressed the sampling methodology applied for the Qualitative activities in section 3.1.1.2.

3.1.1.1. Quantitative Activities

Our IE team submitted a Work Plan discussing their approach to verification priorities. In particular, the team focused significant verification effort on SDG&E's 2020 WMP activities verifiable through field inspections. The full list of these activities is included under section 3.1.2, Large Volume Quantifiable – Field Verifiable.

The IE team utilized the capabilities of Aerial Zeus to concurrently verify SDG&E activity while contributing data that might be useful in creation of new HFTD maps, or demonstrating capabilities as yet unexplored by the Company. Our team developed samples that prioritized risk reduction based on targeted, random, and clustered sampling of Areas of Interest (AOIs) based on the following documentation provided by SDG&E:

- 2020 Wildfire Mitigation Plan
- 2021 Wildfire Mitigation Plan (Used as Reference)
- Quarterly Initiative report
- Quarterly Advice Letters
- Remedial Compliance Plan
- Quarterly Data Report
- Compliance Reports – Complete 2020 Work

- Annual Compliance Report

In addition to the documentation provided by SDG&E, the IE used the following data sources:

- Multispectral satellite imagery from SENTINEL-2 [5] at 10-meter/pixel resolution collected on 5/30/2021.
- SDG&E's GIS data from Quarterly Data Report (QDR) provided by SDG&E's Wildfire Mitigation Program Manager Shaun Gahagan on 5/31/2021 and dated 2/5/2021.
- High Fire Threat District, Tier 2 & 3 published by CPUC.
- VHFHSZ (Very High Fire Hazard Severity Zones) and WUI (Wildland Urban Interface) published by the Office of State Fire Marshal.

The methodology for sampling AOIs consisted of overlapping GIS (Geographic Information System) data provided by SDG&E and satellite imagery. GIS data provided by SDG&E consisted of information on its Distribution and Transmission grids, alongside points and polygons for performed activities described in SDG&E's 2020 WMP and SDG&E's 2020 Annual Compliance Report.

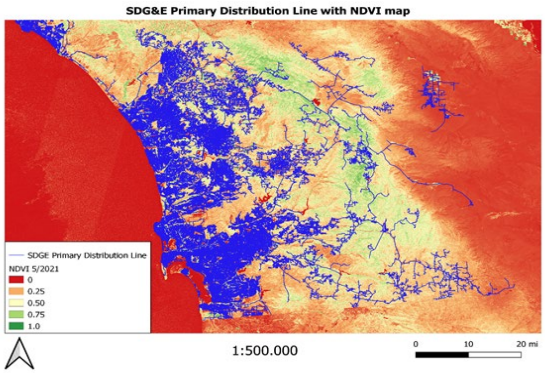
Multispectral satellite imagery was used for developing Normalized Difference Vegetation Index (NDVI) maps and Normalized Difference Moisture Index (NDMI). The rationale for using NDVI values was based on finding spots where vegetation was expected to be strong enough to pose a threat of encroachment. Vegetation vigor has a positive correlation with NDVI values that range from 0-1, with 1 being the highest. High values were represented with a dark green color, while low values were represented in red color. The values between 0-1 were represented by a color ramp made of interpolated color values between dark green and red.

High index values represent spots with high vegetation activity. At the same time low NDVI values indicate dry and dead vegetation, while values near and below zero indicate bare ground, artificial surfaces, and water bodies. Much of the AOIs identified have healthy and high vegetation in their immediate surroundings, and low NDVI vegetation (mostly shrubs and grassland) in the neighboring area. As mentioned earlier, two sets of satellite imagery were used, one dated from May 2021, and another dated from September 2020.

NDVI maps were produced for each of the imagery sets. The NDVI map from May 2021 showed information close to real-time and provided useful information and actual information for our field crews. This aerial intelligence helped the IE select sample spots for more relevant and efficient field inspections. Also, the NDVI map and SDG&E's distribution and transmission grids were overlapped and AOIs were selected based on the following criteria:

- Existence of distribution grid or transmission grid
- Values of NDVI higher than 0.6
- Areas previously inspected by SDG&E
- Areas not previously inspected by SDG&E
- Existence of Tier 2 (Elevated) or Tier 3 (Extreme) fire hazard zones

Figure 1: NDVI Map with Overlapped SDG&E Distribution Line.

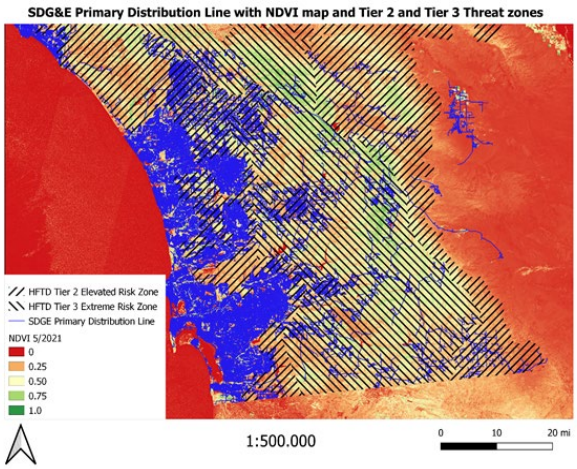


Primary distribution line with NDVI map from May 2021.

Figure 2 shows the following overlapping criteria–Tier 2 and Tier 3 areas, as defined and published by CPUC. In May 2015 CPUC initiated Rulemaking 15-02-006. One of the matters of general scope was the development and adoption of a statewide fire-threat map that delineates the boundaries of a new High Fire-Threat District (HFTD) where the previously adopted regulations will apply.[6]

- Tier 2 hazard zone represents zones with elevated wildfire risk.
- Tier 3 hazard zone represents zones with extreme wildfire risk.

Figure 2: SDG&E Distribution Line with NDVI Base Map, and Tier 2 and Tier 3 Zones.



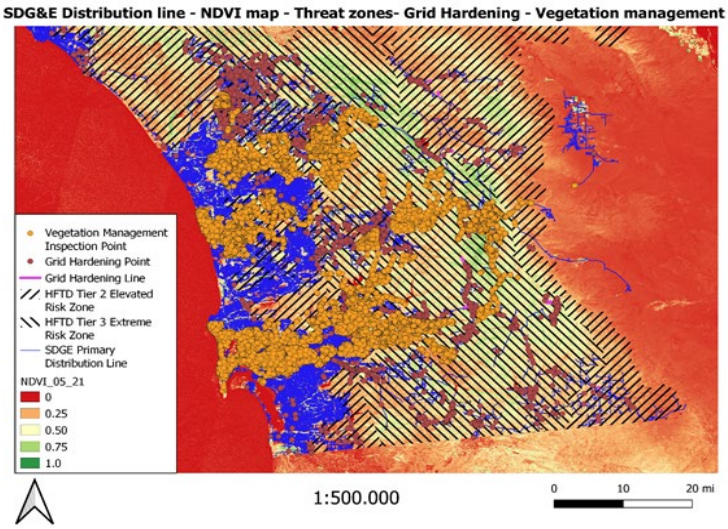
Primary distribution line with NDVI map and Tier 2 and Tier 3 Threat zones.

The NDVI map from September 2020 was used as a support for sampling. Southern California's wildfires can be partitioned by meteorology: fires typically occur either during Santa Ana winds (SA fires) in October through April, or warm and dry periods in June through September (non-SA fires)[3]. Therefore, the IE produced detailed maps of 50 sampled areas with NDVI values, with data on inspections, grid hardening and vegetation management.

Final overlapping is presented in Figure 3. This step included overlapping with SDG&E provided grid hardening and vegetation management locations. This procedure defined 50 samples. 50% of those

sampled areas were selected as Not Inspected. Not Selected samples are those areas which the IE found that fulfill the criteria of presenting potential risk, but SDG&E did not perform Vegetation management nor Grid Hardening work. This approach reviewed not only the work performed by SDG&E but also their approach to what should be inspected.

Figure 3: NDVI Map Overlapped with Distribution Line, Tier 2 & Tier 3 Risk Zones & Work Performed by SDG&E.



SDG&E Distribution line - NDVI map - Threat zones - Grid Hardening - Vegetation Management

3.1.1.2. Qualitative Activities

Data sources for the activities to be verified qualitatively were drawn from and identified by SDG&E WMP subject matter experts (SMEs). The IE team was provided a list of 28 individuals able to speak with detailed knowledge of all 10 areas of the Company's WMP. Interview samples were drawn from this list of 28 in the following clusters. The focus of these interviews evolved to follow the needs of the IE team:

- Round 1: The initial three interviewees were selected by the Company. The focus of these early interviews was on the structure of the WMP program as well as on each SME's knowledge of a wider area of WMP activity.
- Round 2: Four interviews focused on both overall WMP successes, and on the details of WMP activity, with one SME per area. The interviews were supplemented by a one-page "background form" that requested the SME provide an overview of activities in the targeted WMP category.
- Round 3: The final four interviews were determined by areas where the IE a) needed to complete the verification of Qualitative activities, and b) sought to verify specific activity details in the SME's area of expertise.

Further review of the Qualitative activities is provided in section 3.1.5.1, with a discussion of the Trends and Themes seen in this review provided in section 3.1.5.2.

3.1.2. Large Volume (≥100 units) Quantifiable Goal/Target + Field Verifiable

Table 2: Large Volume Quantifiable Field Verifiable Activities Variance Explanation

Table 2 - Large Volume Quantifiable Field Verifiable Activities Variance Explanation					
Category #	Category	Activity#	Activity	% Budget	SDG&E Variance Explanation
5.3.3	Grid Design and System Hardening	5.3.3.17.1	Transmission Fire Hardening - Transmission OH	86%	Underage tied to the reduction in miles hardened in 2020, a reduction from 21.5 miles (target) to 19.7 miles (actual)
		5.3.3.17.1	Transmission Fire Hardening - Transmission UG		
5.3.5	Vegetation Management & Inspections	5.3.5.9	inspections, patrols, and trims	43%	2020 forecast included both fuels management and enhanced trim, now split
		5.3.5.20	Pole brushing	91%	no explanation provided

Table 3: Large Volume Quantifiable Field Verifiable Activities Budget Variance

Table 3 - Large Volume Quantifiable Field Verifiable Activities Budget Variance								
Category #	Category	Activity#	Activity	Capital ($000)		O&M ($000)		% Budget
				Target	Actual	Target	Actual	
5.3.2	Situational Awareness & Forecasting	5.3.2.3	Wireless Fault Indicators	$ 630	$ 835	n/a	n/a	133%
5.3.3	Grid Design & System Hardening	5.3.3.3	Distribution Overhead System Hardening - Covered Conductor	$ 1,071	$ 1,798	n/a	n/a	168%
		5.3.3.3	Distribution Overhead System	$ 87,000	$ 138,378	n/a	$ 3,446	159%
		5.3.3.7	Expulsion fuse replacement	$ 3,737	$ 6,521	n/a	n/a	174%
		5.3.3.10	Hotline Clamps	$ 3,000	$ 3,299	n/a	n/a	110%
		5.3.3.16	Strategic Undergrounding	$ 31,000	$ 38,850	n/a	n/a	125%
		5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission OH	$ 5,871	$ 5,030	n/a	n/a	86%
		5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission UG					
		5.3.3.17.1	Overhead Transmission Fire Hardening -					
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Transmission OH					
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH	$ 35,000	$ 46,271	n/a	n/a	132%
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH w/associated Transmission mileage					
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution UG	$ 30,000	$ 37,973			127%
5.3.4	Asset Management & Inspections	5.3.3.6	Pole Replacement and Reinforcement	$ 10,568	$ 10,925	n/a	n/a	103%
5.3.5	Vegetation Management & Inspections	5.3.5.5	Fuels Management			$ 5,000	$ 5,805	116%
		5.3.5.9	Enhanced inspections, patrols, and trims			$ 23,603	$ 10,235	43%
		5.3.5.20	Pole brushing			$ 5,943	$ 5,433	91%

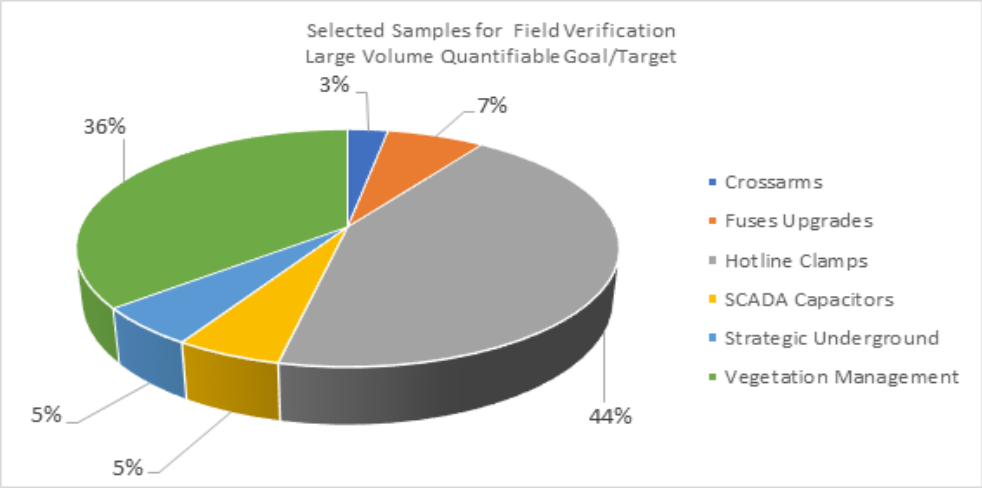
Table 4: Large Volume Quantifiable Field Verifiable Activities List

Table 4 - Large Volume Quantifiable Field Verifiable Activities List							
Category #	Category	Activity#	Activity	Units	Planned	Actual	% Outcom
5.3.2	Situational Awareness & Forecasting	5.3.2.3	Wireless Fault Indicators	Wireless fault indicators	500	502	100%
5.3.3	Grid Design & System Hardening	5.3.3.3	Distribution Overhead System Hardening - Covered	Miles covered conductor	1	1.9	190%
		5.3.3.3	Distribution Overhead System Hardening - OH (bare wire)	Miles bare wire	102	99.5	98%
		5.3.3.7	Expulsion fuse replacement	Fuses	3000	3179	106%
		5.3.3.10	Hotline Clamps	Hotline Clamps	1650	2061	125%
		5.3.3.16	Strategic Undergrounding	Miles	10	15.6	156%
		5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission OH	Miles transmission OH	21.5	19.7	92%
		5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission UG	Miles transmission UG	0	0	
		5.3.3.17.1	Overhead Transmission Fire Hardening - Distribution Underbuilt	Miles distribution underbuilt	10	9.4	94%
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Transmission OH	Miles transmission OH	29	29.1	100%
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH	Miles distribution OH	50	46.8	94%
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH w/associated Transmission mileage				
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution UG	Miles distribution UG	14	14.4	103%

5.3.4	Asset Management & Inspections	5.3.3.6	Pole Replacement and Reinforcement	Poles	670	598	89%
5.3.5	Vegetation Management & Inspections	5.3.5.5	Fuels Management	Poles cleared	500	324	65%
		5.3.5.9	Enhanced inspections, patrols, and trims	Trim/Remove	17,000	17,075	100%
		5.3.5.20	Pole brushing	Poles brushed	35500	35563	100%

In order to verify compliance with SDG&E's 2020 WMP, the Independent Evaluator prioritized SDG&E's WMP activities and Volume Quantifiable Goal/Target-Field Verifiable by selecting a total of 597 sample points to be verified. 261 samples (44%) were Hotline Clamps, 214 (36%) were related to Vegetation Management, 41 samples (7%) were Fuses Upgrades, 32 samples (5%) Strategic Underground activities, and 17 samples (3%) were related to Crossarms (Chart 1).

Chart 1: Sample Points Selected for Field Verification.



3.1.2.1 — Review of Initiatives

This section should include the Independent Evaluator's findings and assessment of utility compliance with activities that fall into the Large Volume Quantifiable Goal/Target – Field Verifiable category. Independent Evaluators shall conduct field verification to confirm installation, work quality, and adherence to applicable utility protocols and standards for such work.

Include the electrical corporation's list of initiatives that fall into the Large Volume Quantifiable Goal/Target – Field Verifiable category, including respective goals/targets for each, in the Appendix or within the body of this subsection.

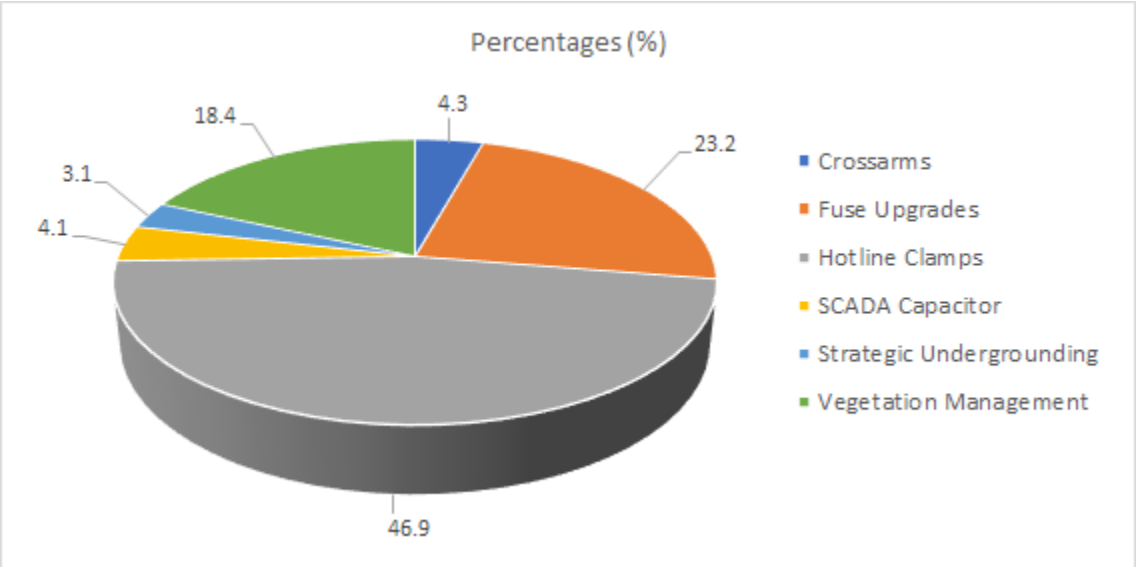
Table 5: Large Volume Quantifiable Field Verifiable Activities List and Completion Summary

Table 5 - Large Volume Quantifiable Field Verifiable Activities List and Completion Summary												
Category #	Category	Activity#	Activity	Units	Planned	Actual	% Outcom	Capital ($000)		O&M ($000)		% Budget
								Target	Actual	Target	Actual	
5.3.2	Situational Awareness & Forecasting	5.3.2.3	Wireless Fault Indicators	Wireless fault indicators	500	502	100%	$ 630	$ 835	n/a	n/a	133%
5.3.3	Grid Design & System Hardening	5.3.3.3	Distribution Overhead System Hardening - Covered Conductor	Miles covered conductor	1	1.9	190%	$ 1,071	$ 1,798	n/a	n/a	168%
		5.3.3.3	Distribution Overhead System Hardening - OH (bare wire)	Miles bare wire	102	99.5	98%	$ 87,000	$ 138,378	n/a	$ 3,446	159%
		5.3.3.7	Expulsion fuse replacement	Fuses	3000	3179	106%	$ 3,737	$ 6,521	n/a	n/a	174%
		5.3.3.10	Hotline Clamps	Hotline Clamps	1650	2061	125%	$ 3,000	$ 3,299	n/a	n/a	110%
		5.3.3.16	Strategic Undergrounding	Miles	10	15.6	156%	$ 31,000	$ 38,850	n/a	n/a	125%
		5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission OH	Miles transmission OH	21.5	19.7	92%	$ 5,871	$ 5,030	n/a	n/a	86%
		5.3.3.17.1	Transmission Fire Hardening - Transmission UG	Miles transmission UG	0	0						
		5.3.3.17.1	Overhead Transmission Fire Hardening - Distribution Underbuilt	Miles distribution underbuilt	10	9.4	94%					
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Transmission OH	Miles transmission OH	29	29.1	100%					
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH	Miles distribution OH	50	46.8	94%	$ 35,000	$ 46,271	n/a	n/a	132%
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH w/associated Transmission mileage									

		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH	Miles distribution OH	50	46.8	94%	$ 35,000	$ 46,271	n/a	n/a	132%
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH w/associated Transmission mileage									
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution UG	Miles distribution UG	14	14.4	103%	$ 30,000	$ 37,973			127%
5.3.4	Asset Management & Inspections	5.3.3.6	Pole Replacement and Reinforcement	Poles	670	598	89%	$ 10,568	$ 10,925	n/a	n/a	103%
5.3.5	Vegetation Management & Inspections	5.3.5.5	Fuels Management	Poles cleared	500	324	65%			$ 5,000	$ 5,805	116%
		5.3.5.9	Enhanced inspections, patrols, and trims	Trim/Remove	17,000	17,075	100%			$ 23,603	$ 10,235	43%
		5.3.5.20	Pole brushing	Poles brushed	35500	35563	100%			$ 5,943	$ 5,433	91%

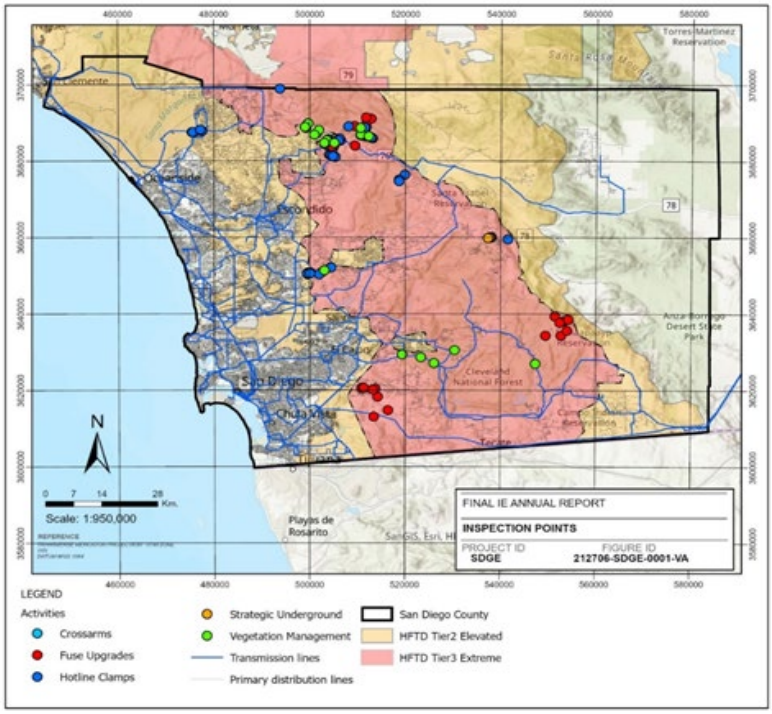
From the 597 samples selected, 376 field inspections were carried out from June 9th-13th, 2021 within the boundaries of the CPUC High Fire-Threat District (HFTD) Tier 2 and 3. During the field inspections, the goal was to verify hardware installation, quality of the work performed, and adherence to applicable utility protocols and standards. 84 (22%) of all inspections were performed in Tier 2, and 292 (78%) in Tier 3. 184 (49%) field inspections were conducted on Hotline Clamps, 91 inspections (24%) on Fuse Upgrades, 72 inspections (19%) on vegetation management, 17 inspections (5%) on Crossarms and 12 inspections (3%) on the verification of Strategic Underground assets, Chart 2, below.

Chart 2: Verification of Activities Categorized as Large Volume Quantifiable Goal/Target - Field Verifiable.



In addition, Figure 4 shows the spatial distribution of the field inspections conducted. Most inspections were carried out in Tier 3, near Pauma Valley, Palomar Mountain, Northeast of Poway, Jamul, Mount Laguna, and South of Fallbrook.

Figure 4: Spatial Distribution of Large Volume Quantifiable Goal/Target - Field Verifiable inspections.



Based on the analysis of multispectral satellite images, Chart 3 shows the inspection points, based on NDVI values, selected to carry out field inspections. 84% of the inspection points were in areas with low NDVI, 12% in places with medium-range NDVI, and 4% in places with a low vegetation index. It should be noted that the use of NDVI values, as an indicator of vegetation health, refers to the fact that areas with vegetation indices with low and medium ranges usually are in areas where the vegetation is dry and potentially more flammable. Areas with a high NDVI values can indicate dense foliage that can cause vegetation encroachment into power lines or any type of electrical structure.

Chart 3: Location of sampling inspection points based on NDVI values: a) Low ranges: NDVI <0.59 b) Medium ranges: NDVI 0.6-0.8 and c) High ranges: NDVI >0.8.

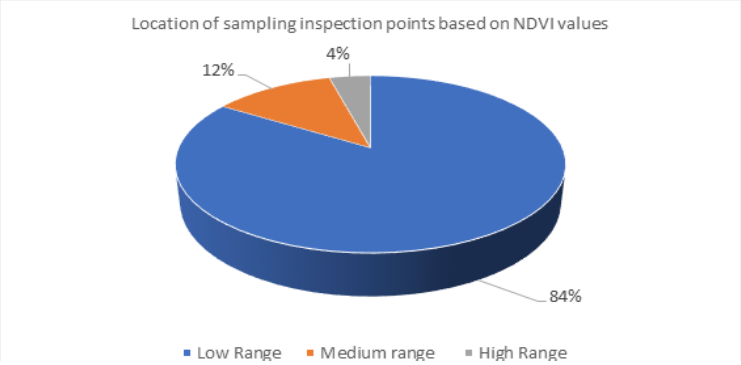


Figure 5 displays an NDVI map with all the inspection points within Tier 3.

Figure 5: Inspection Points Based on NDVI index.

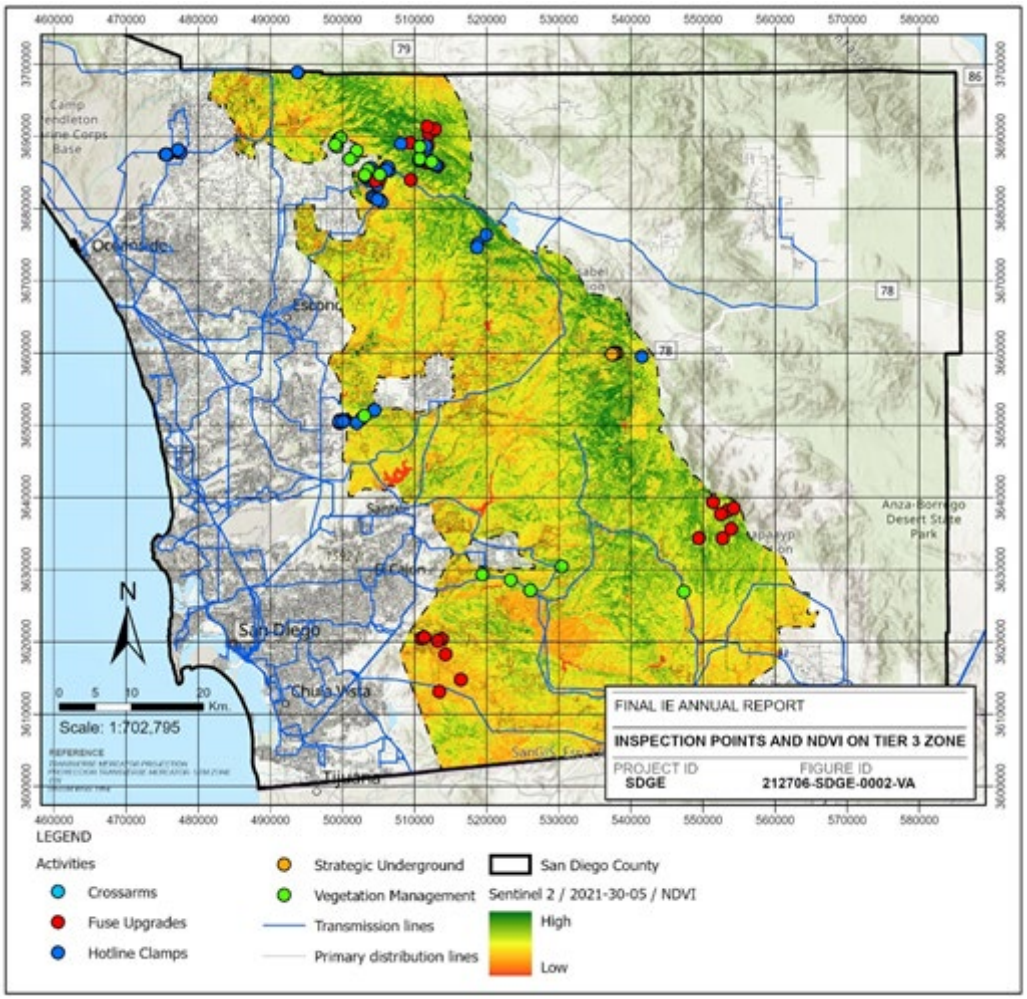
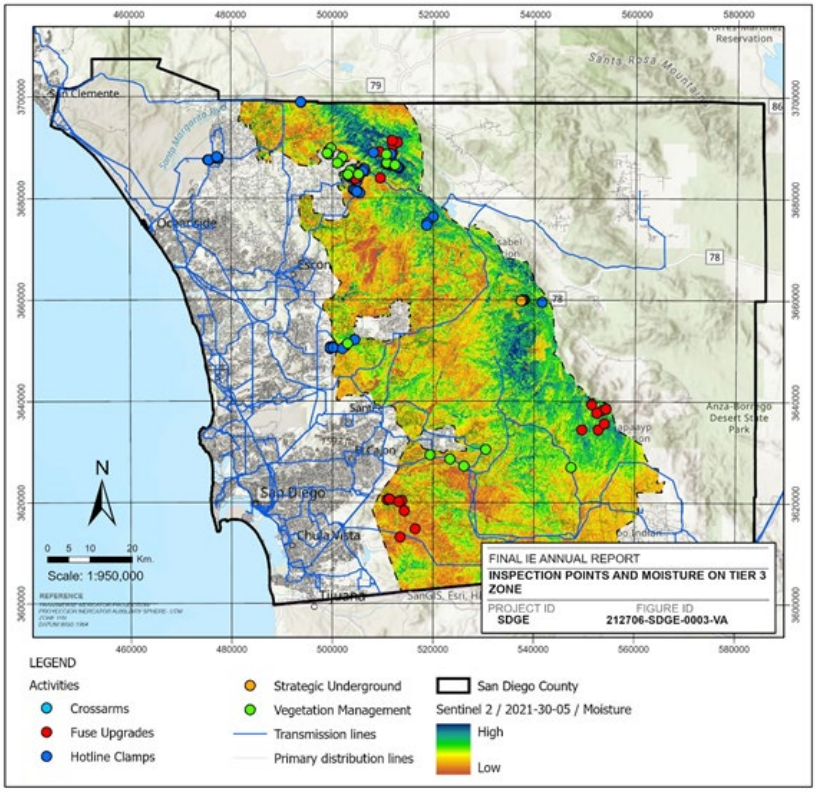


Figure 6 below shows the Normalized Difference Moisture Index, NDMI, based on Multispectral Satellite imagery. This Figure provides further evidence that most of the selected field inspection points were in zones with low NDMI values.

The NDMI index uses NIR (Near Infrared) and SWIR (Short-Wave Infrared) Satellite's imagery/ bands to display moisture. The SWIR band reflects changes in vegetation water content and the spongy mesophyll structure in vegetation canopies. At the same time, the NIR reflectance is affected by internal structure and leaf dry matter content, but not by water content. The combination of the NIR with the SWIR removes variations induced by internal structure and leaf dry matter content, improving the accuracy in retrieving the vegetation water content. NDMI values were in a range from 0-1, with 1 being the highest. Lower values refer to dry vegetation, and higher values are related to vegetation with high water content in its canopy.

Figure 6: Inspection Points location Based on the Moisture Index.



5.3.3.3 - Distribution Overhead System Hardening

5.3.3.7 - Expulsion Fuse Replacement (Large volume)

5.3.3.10 - Hotline Clamps (Large volume)

5.3.3.6 - Pole Replacement and reinforcements (Large volume)

5.3.5.5 - Fuels Management (Large volume)

3.1.2.2 — Trends and Themes

Include any trends or recurring themes that the Independent Evaluator found while assessing utility compliance to Large Volume Quantifiable Goal/Target – Field Verifiable initiatives.

Hotline Clamps, Pole Replacements, Fuel Management, and Distribution Overhead System Hardening in the High Fire Threat District, Tiers 2 and 3 published by CPUC and VHFHSZ, Wildland Urban Interface (WUI)

published by the Office of State Fire Marshal, work was completed and performed in compliance with GO-165, PRC 4292, PRC 4293, GO 128.

System Hardening to assets provided throughout the most populated area in Tiers 2 and 3 have been provided by the utility provider as full system Harding and strategic undergrounding.

Areas in the above locations have had large investment in the infrastructure—most poles have been replaced with steel poles and all aspects cross arms, fuses, fuel management, and covered conductors have all been set up to meet the System Hardening.

In the provided reports, multiple items on the same work order were listed multiple times for the same work type. In some cases, the list called out 4, 6, or 8 fuses and only 2 or 4 fuses existed on the pole. [7]

Common themes throughout the utility proved work order for 2020 verification of completed WMP work order to quantifiable large and small field verifiable initiative is as followed:

Work order indicated multiple WMP incentives being installed (such as hot clamps, fuses, etc.). The field report showed that the work order for pole/assets tags did not match the number of the proposed hardening features indicated on the task order list.

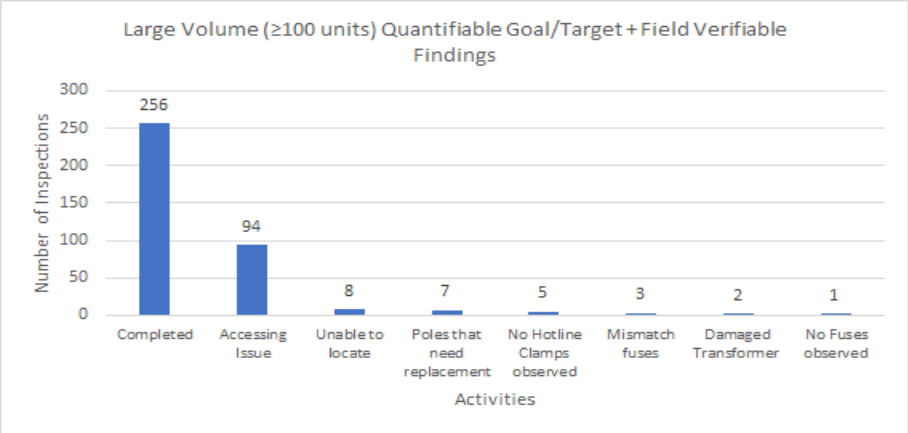
SDG&E WMP Completed Activities List Sample of Work Order Discrepancy

C-JU1 HFTD Hot Line Clamps P198380	530000180217	Completed	Julian	Northeast	S.D. County	JUI	P198380	Distribution Pole	SDGE	229-HLC Corrective Small Capacity
C-JU1 HFTD Hot Line Clamps P198380	530000180217	Completed	Julian	Northeast	S.D. County	JUI	P198380	Distribution Pole	SDGE	229-HLC Corrective Small Capacity
C-JU1 HFTD Hot Line Clamps P198380	530000180217	Completed	Julian	Northeast	S.D. County	JUI	P198380	Distribution Pole	SDGE	229-HLC Corrective Small Capacity
C-JU1	530000180217	Completed	Julian	Northeast	S.D. County	JUI	P198380	Distribution Pole	SDGE	229-HLC Corrective Small Capacity
C-JU1	530000180217	Completed	Julian	Northeast	S.D. County	JUI	P198380	Distribution Pole	SDGE	229-HLC Corrective Small Capacity

Large Volume Field Verifiable Independent Evaluator Inspection Reports:
https://app.box.com/s/kp2m0uinolxmpwa3jhwgs8ujd9qlnpge

Based on analysis of the data collected during field verification, Chart 4 shows our general findings. A more detailed description of the field reports indicate that 284 (68.1%) assets could be verified (completed) and considered in compliance with hardening activities according to hardware installation, quality of the work, and adherence to applicable utility protocols and standards. In 94 (25%) locations, the field crew experienced access issues since the assets were located in private properties or in natural reserves. 7 inspection reports (1.9%) referred to the existence of old wooden poles that need replacement, 5 reports (1.3%) where Hotline Clamps were not observed despite the asset records indicating their existence. 8 (2.1%) of the assets could not be found due to the wrong/unprecise GPS-coordinates provided by SDG&E, 3 inspections (0.8%) mismatch between the listed fuses on record vs. actual, 2 transformers (0.5%) show signs of external damage and 1 report (0.3%) where the fuses were not observed despite SDG&E's asset records.

Chart 4: General Findings of Large Volume (≥100 units) Quantifiable Goal/Target & Field Verifiable.



3.1.3 — Large Volume Quantifiable Goal/Target – Not Field Verifiable

Activity Initiatives 1: https://app.box.com/s/6avpqoiq47lbw6omgnhvtc6kx46k6oa8

Activity Initiatives 2: https://app.box.com/s/x9q9siuvl7hy5u58ti4akmrkp9xhhtch

3.1.3.1 — Review of Initiatives

This section should include the Independent Evaluator's findings and assessment of utility compliance with activities that fall into the Large Volume Quantifiable Goal/Target – Not Field Verifiable category. Independent Evaluators shall select a sample to seek additional documentation and conduct SME interviews, as needed, to verify that the activity was completed and executed in accordance with all applicable work procedures and protocols.

Include the electrical corporation's list of initiatives that fall into the Large Volume Quantifiable Goal/Target – Not Field Verifiable category, including respective goals/targets for each, in the Appendix or within the body of this subsection.

This WMP category contains activities that are quantifiable and large in volume (100 or more), but that cannot be verified in the field. Table 6 summarizes the twelve areas of activity that fall into this category. The chart also shows that these activities are clustered into three initiative areas: 5.3.3 – Grid Design and System Hardening, 5.3.4 – Asset Management and Inspections, and 5.3.5 – Vegetation Management and Inspections.

Of the twelve activities, the three Grid Hardening activities show considerable variance in units delivered, a pattern also reflected in the funding analysis in section 3.2. The IE's field inspection activities, conducted in support of the activities in 3.1.2 – Large Volume Quantifiable – Field Verifiable activities, yields insights applicable to this category as well; these are discussed further below.

Table 6: Large Volume Field Non-Verifiable Activities List

Table - Large Volume Field Non-Verifiable Activities List							
Category #	Category	Activity #	Activity	Units	Planned	Actual	% Outcome
5.3.3	Grid Design & System Hardening	5.3.3.11.1	Customer Resiliency Programs	Generators	1250	1334	107%
		5.3.3.11.2	Expanded generator grant program		130	1274	980%
		5.3.3.11.3	Whole house generator program		300	75	25%
5.3.4	Asset Management & Inspections	5.3.4.1	Detailed corrective maintenance program inspections	Inspections	17500	17977	103%
		5.3.4.2	Transmission System Inspections - Visual	Inspections (Visual)	117	114	97%
			Transmission System Inspections - Infrared	Inspections (Infrared)	113	110	97%
			Transmission System Inspections - Detailed	Inspections (Detailed)	41	41	100%
			Transmission System Inspections - Aerial	Inspections (Aerial 69kV)	27	21	78%
		5.3.4.4	Infrared inspections of distribution infrastructure	Inspections	8,500	13,077	154%
		5.3.4.6	Intrusive pole inspections - distribution		18,000	14,450	80%
		5.3.4.9.1	HFTD Tier 3 Inspections		11,500	11,864	103%
		5.3.4.9.2	Drone assessments of distribution infrastructure		33,000	37,310	113%
		5.3.4.11	Patrol inspections of distribution poles - CMP		86,000	86,075	100%
		5.3.4.15	Substation System Inspection		330	405	123%
5.3.5	Vegetation Management & Inspections	5.3.5.2	Detailed inspections of vegetation around distribution infrastructure - tree trimming		455,000	451,207	99%

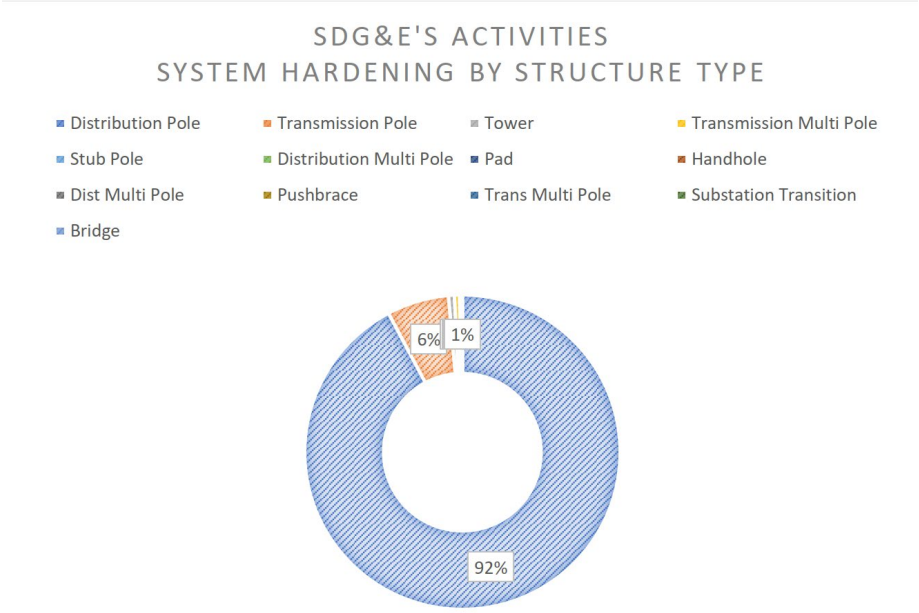
Grid Design and System Hardening: The three activities in this group all concerned steps taken to harden the grid using additional generation capacity, usually added at the customer location. Two of the three of these programs were underspent, while the third (5.3.3.11.2 – Expanded Generator Grant Program) is wildly overspent.

SDG&E's explanation (see 3.2.2) is that the total of these three areas spent within 5% of the total planned budget for the three. SME insight suggested another reason for the shortfall in 5.3.3.11.3 -- Whole House Generator program. Unlike many other hardware-related activities in 5.3.3 Grid Design and Hardening, Whole House Generators, and 5.3.3.8.2 Microgrids, represent areas that are new to SDG&E staff. When

replacing conductors or reclosers, for example, staff have well-established protocols, considerable experience implementing these actions, and the ability to deal with unexpected issues that arise in the field. In the Whole House Generator program specifically, it was reported that this area is brand new to staff. SDG&E are long-accustomed to placing generation equipment on company-owned assets. Placing generators in customer homes, however, entails a host of new areas – applying for permits, for example, that cause significant (unexpected) delays and an accumulating shortfall in overall spend.

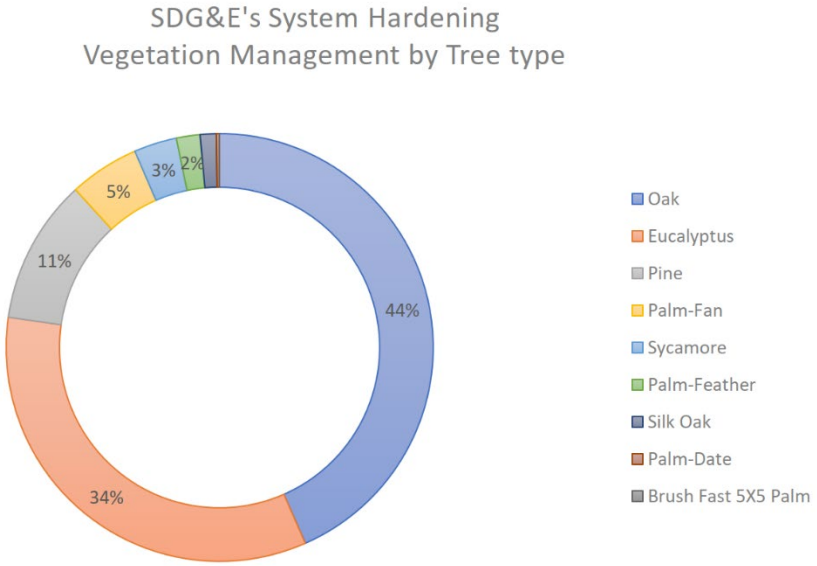
Asset Management and Inspections – IE analysis of inspection work orders confirmed the balance of work associated with these inspections, per Chart 5 below detailing SDG&E's Activities System Hardening by Structure Type below. While a majority of work orders concern vegetation management activities, the 16% of non-vegetation-related field work falls into the activities shown below. IE data from the field verification activities contains additional detail and insights applicable to non-field verifiable activities as well.

Chart 5: SDG&E's Activities – System Hardening by Structure Type



Vegetation Management: 84% of all work orders for WMP activity were related to vegetation management. Out of this portion, 79% of these activities are concentrated in the northeast, eastern and north coast districts of SDG&E's Tier 3 HFTD territory, 60% in the northeast and eastern districts, and 92% focus on distribution poles. IE's analysis of field-verifiable activities and work order patterns also reveals that vegetation management activities end up disproportionately focused on two species, pine, and eucalyptus, per the chart below. Insights of this nature may enable vegetation management teams to better plan and prepare for activities with high probability focused on those species.

Chart 6: SDG&E's System Hardening – Vegetation Management by Tree Type



3.1.3.2 Trends and Themes

Include any trends or recurring themes that the Independent Evaluator found while assessing utility compliance to Large Volume Quantifiable Goal/Target – Not Field Verifiable initiatives.

The eleven areas of high-volume activity that cannot be verified in the field include inspections of both vegetation and hardware, and grid hardening activities falling into three areas aimed at improving customer resiliency.

- Dramatic fluctuations can be seen in the outcomes for different aspects of the resiliency program, from almost 10 times the target for the expanded generator program, while the Whole House Generator program met only one-quarter of its target.
- The Whole House Generator program encountered challenges in its first year in 2020 due, according to SME interviews, to the nature of the customer-centered nature of the work. SDG&E personnel are familiar with similar work in SDG&E facilities, but less familiar with the prerequisites of work on customer sites. For future customer-focused programs of this type, SDG&E should apply lessons learned about permits, working on customer premises, etc., to the timelines and budget forecasts for these activities.
- Transmission poles have been getting less maintenance, as a percentage of the total vegetation management effort.
- The area of transmission system inspections shows four subcategories yet provides no detail on the number of inspections of each type. Better understanding of the balance of use of these inspection approaches may enable more efficient use of inspection resources.
- The use of aerial intelligence from satellites could SDG&E with a more precise view of the vegetation distribution of trees and biofuel sources on the ground in their territory. Tighter insight of vegetation

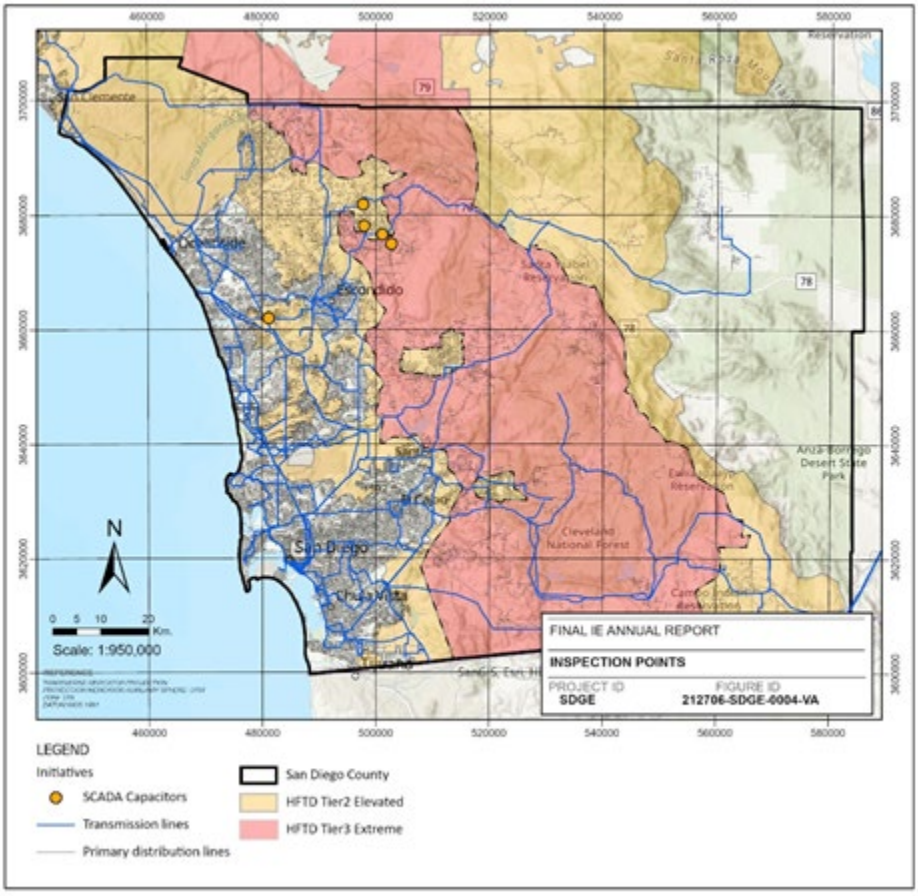
types, for example, could enable more precise timing, improve logistics and overall better deployment of vegetation management activities.

- The IE's analysis of the work orders shows that there are multiple work orders for the same poles and/or poles and trees adjacent. IE's review of 81,555 work orders suggests that SDG&E should re-assess the way work is assigned and tracked. For example, multiple work orders were assigned to the same tree, on a given date, for what it seems the same task. This might be misinterpreted as the same work done more than once and/or overly counted.

3.1.4— Small (less than 100 items) Volume Quantifiable Goal/Target

For Small Volume Quantifiable Goal/Target Field Verifiable, 16 inspections were conducted from June 9th-13th, 2021 inside the boundaries of the CPUC HFTD Tier 2 and 3. As previously mentioned, during the field inspections crew verified the hardware installation, the quality of the work performed, and the adherence to applicable utility protocols and standards. Moreover, 11 (69%) of the inspections were performed in the HFTD Tier 2 and 5 (31%) in the HFTD Tier 3.

Figure 7: Spatial Distribution of Small Volume Quantifiable Goal/Target - Field Verifiable Inspections.



3.1.4.1 — Review of Initiatives

This section should include the Independent Evaluator's findings and assessment of utility compliance with activities that fall into the Small Volume Quantifiable Goal/Target category. Independent Evaluators shall perform data/documentation review and conduct SME interviews, as needed, to verify completion of these activities and adherence to all applicable work procedures and protocols.

Include the electrical corporation's list of initiatives that fall into the Small Volume Quantifiable Goal/Target category, including respective goals/targets for each, in the Appendix or within the body of this subsection.

This category of the WMP is defined as activities quantifiable and verifiable but small in number. Table 6 summarizes the twelve activities that fall into this category. This shows that these are clustered in the WMP categories of 5.3.2 – Situational Awareness and Forecasting and 5.3.3 – Grid Design and System Hardening.

Of these 12 activities, the chart below shows that seven of the 12 met their outcome objectives and five did not.

Table 7: Small Volume Quantifiable

Small Volume Quantifiable							
Category #	Category	Activity #	Activity	Units	Planned	Actual	% Outcome
5.3.2	Situational Awareness & Forecasting	5.3.2.1	Camera Networks	Cameras	4	4	100%
			Weather Stations	Weather Stations	20	30	67%
		5.3.2.4.1	Fire Science and Climate Adaptation Department	Fire Science and Innovation Lab	1	1	100%
5.3.3	Grid Design & System Hardening	5.3.3.1	SCADA Capacitors	SCADA	30	30	100%
		5.3.3.2	Advanced Protection	Circuits	8	6	133%
				Substations	6	8	75%
		5.3.3.8.1	PSPS sectionalizing enhancements	Switches	7	23	30%
		5.3.3.8.2	Microgrids	Microgrids	3	4	75%
		5.3.3.11.1	Customer Resiliency Programs	Community Resource Centers	8	8	100%
				Generators Leased	4	4	100%
		5.3.3.18.1	Distribution Communications Reliability Improvements	Stations	25	15	167%
		5.3.3.18.2	Lightning arrestor removal and replacement	n/a	0	n/a	

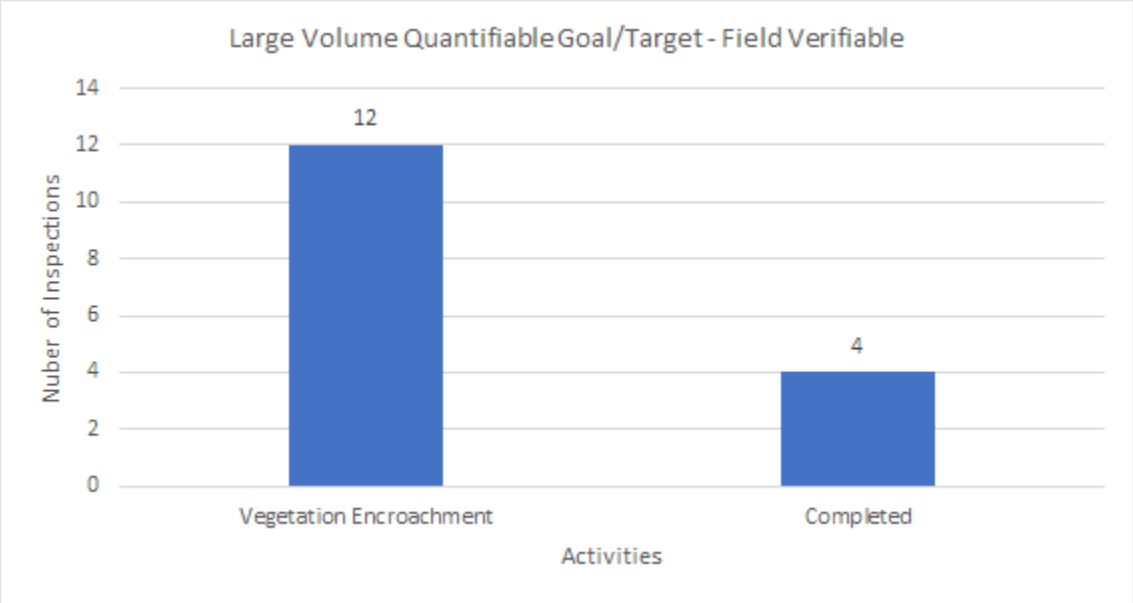
Due to the very compressed timeframe for this evaluation, the IE team chose to devote their finite time and resources to categories of activity likely to yield high value and insight to the CPUC and SDG&E in the near-term. Accordingly, the review of initiatives in this category was accomplished primarily via financial reports and is covered in section 3.2 – Verification of Funding. Insights from qualitative interviews with SMEs have supplemented the financial review and are included in the section that follows 3.1.4.2 – Trends and Themes.

3.1.4.2 — Trends and Themes

Include any trends or recurring themes that the Independent Evaluator found while assessing utility compliance to Small Volume Quantifiable Goal/Target initiatives.

SCADA Capacitors yielded no issues on 4 (25%) field reports, since the equipment, at least visually, looked in compliance with hardening activities according to its installation & quality of the work. In 12 field reports (75%), significant vegetation encroachment was observed (Chart 7).

Chart 7: Field Inspection Reports of Small Volume Quantifiable Goal/Target - Field Verifiable.



SDG&E, in partnership with multiple academic institutions, has expanded its capabilities to forecast and model weather patterns via its network of cameras and weather stations. This new approach has enabled SDG&E to have better planning for any potential PSPS events.

3.1.5 — Qualitative Goal/Targets

In the WMP and associated guidance, the CPUC recognizes appropriately that not all initiatives can be verified through quantitative means. In many cases, completion of the targeted outcome is verifiable in simple terms–does the new initiative, program or protocol exist or not? Is it in use? These are the kinds of questions used to verify activities listed for Qualitative verification.

As discussed in section 3.1.1.2, verification methodology for activities with qualitative targets relied heavily on interviews with Subject Matter Experts (SMEs) and review of sample documentation on the activity. The list of SMEs interviewed and the timing of those interviews is summarized in Table 8 below.

Table 8: List of Qualitative Interviews

Table 8 - List of Qualitative Interviews				
Name	Title	Subject Matter Expert for:	Interview Date	Interview Focus
Sarah Almujahed	Wildfire Mitigation Strategy Mgr	5.3.1 - Risk Assessment and Mapping	June 25	WiNGS and other risk modeling
Chris Arends	Meterology Program Manager	5.3.2 - Situational Awareness and Forecasting	June 23	Fire science programs
Willie Thomas	Electric System Hardening Program Mgr	5.3.3 - Grid Design and System Hardening	June 25	Uses and documentation of LiDAR
Shaun Gahagan	Wildfire Mitigation Program Mgr		June 10	Overview of WMP program
Jennifer Kaminsky	Project Manager, Transmission and Distribution Projects	5.3.4 - Asset Management and Inspections	June 24	Drone inspection program for distribution and transmission assets
Mike Daleo	System Forester	5.3.5 - Vegetation Management	June 25	Vegetation management efforts
Richie Veihl	Fire Coordinator	5.3.6 - Grid Operations and Protocols	June 23	Coordination w outside fire resources
Cory Mitsui	Electric Distribution Control Center Mgr		June 10	Grid operations protocols
Jungyoon Sounnadath	Software Team Lead	5.3.7 - Data Governance	June 23	Centralized data repository
Joy Estrelon	Asset Management Program Mgr	5.3.8 - Resource Allocation Methodology	June 28	Asset management program
Mona Freels	Emergency Operations Service Manager	5.3.9 - Emergency Planning and Preparedness	June 28	Emergency planning for WMP
Zoraya Griffin	Sr. Communications Manager - Wildfire Safety and Operations	5.3.10 - Stakeholder Cooperation and Community Engagement	June 10	WMP communications and stakeholder outreach activities

3.1.5.1 — Review of Initiatives

This section should include the Independent Evaluator's findings and assessment of utility compliance with activities that fall into the Qualitative Goal/Target category. Independent Evaluators shall review documentation and conduct SME interviews, as needed, to verify the qualitative goals/targets of these activities were met.

Include the electrical corporation's list of initiatives that fall into the Qualitative Goal/Target category, including respective goals/targets for each, in the Appendix or within the body of this subsection.

The IE team notes that, of the 100+ areas of activity listed in SDG&E's 2020 WMP, 51 of these are designated as requiring Qualitative assessment of their completion and WMP compliance. Please see the full list of Qualitative measures in Table 9 below.

Qualitative review of compliance can be completed in multiple ways. In addition to considerable financial reporting and other forms of quantitative data, SDG&E also provided a list of 28 SMEs as candidates for interviews to assess progress against Qualitative measures in the WMP.

Table 9: Qualitative Activities Summary

Table 9 - Qualitative Activities Summary								
Category #	Category	Activity#	Activity	Capital ($000)		O&M ($000)		% Budget
				Target	Actual	Target	Actual	
5.3.7	Data governance	5.3.7.1	Centralized repository for data		$ 5,272			
		5.3.7.1.2	Geographic information system data	Embedded within normal operations				
		5.3.7.2	Collaborative research on utility ignition and/or wildfire - Innovation lab and other collaboration	Embedded within the Fire Science and Climate Adaptation Department				
		5.3.7.3	Wildfire-related data and algorithms		$ 2,208			
		5.3.7.4.1	Ignition management program			$ 315		
		5.3.7.4.2	Reliability database	Embedded within normal operations				
5.3.8	Resource allocation methodology	5.3.8.1	Asset management	$ 9,697	$ 1,623	$ 450	$ 329	19%
		5.3.8.2	Risk reduction scenario development and analysis	WMP refers to section 5.4				
		5.3.8.3	Risk spend efficiency analysis	embedded within normal operations				
		5.3.8.4	Other resource allocation methodology initiatives					
		5.3.8.4.1	Wildfire mitigation personnel			$ 1,838	$ 3,389	184%
		5.3.8.4.2	PSPS mitigation engineering team	Costs for this team were tracked within the Wildfire Mitigation Personnel program				
5.3.9	Emergency planning and preparedness	5.3.9.1	Overview of emergency preparedness plan	Tracked within Emergency Management Operations				
		5.3.9.2	Overview of customer support in emergencies	Tracked within Emergency Management Operations				
		5.3.9.3	Coordination with public safety partners	Embedded within normal operations				
		5.3.9.4.1	Adequate and trained workforce for service restoration	Embedded within normal operations				
		5.3.9.4.4.1	Company emergency response plan overview	Embedded within normal operations				
		5.3.9.4.5	Preparedness and planning for service restoration - Mutual assistance and contractors	Embedded within normal operations				
		5.3.9.4.6	Protocols in place to learn from wildfire events - After action reports	Embedded within normal operations				
		5.3.9.4.7	Other - Emergency management operations	$ 4,500	$ 2,140	$ 4,821	$ 12,214	154%
5.3.10	Stakeholder Cooperation and Community Engagement	5.3.10.1	Community engagement - Community outreach and public awareness			$ 448		
		5.3.10.2	Cooperation and best practice sharing with agencies outside California			$ 4,928	$ 8,227	167%
		5.3.10.3	Cooperation with suppression agencies				$ 86	

With one exception, all areas of WMP activity contained measures reliant on qualitative verification. As described in 3.1.1.2, SME interviews were qualitative in nature and differed slightly over the evaluation period, reflecting the need for increased depth in some areas.

Table 9 shows that WMP categories differed in the number of activities requiring qualitative verification, from a low of zero (5.3.3 – Grid Design and System Hardening), a high of nine (5.3.6 – Grid Operations and Protocols) and an average of five such measures per category. This variation reflects the nature of the work in each category. 5.3.3 – Grid Design and System Hardening targets concern the replacement of large volumes of hardware, verifiable through field inspection and discussed in section 5.1.2. By contrast, 5.3.6 – Grid Operations and Protocols relies heavily on the development, refinement and use of internal protocols and procedures, measures that require verification by qualitative means.

Table 9 summarizes the outcomes verified for these qualitative activities. Section 3.1.5.2. Trends and Themes discusses these findings in further detail.

Where insights from these interviews were useful to inform the discussion of results in other areas, these have been included in that section of this report (e.g., shortfalls in Grid Design and Hardening, 5.3.3.11.3. Whole House Generator program is discussed in 3.2. Verification of Funding below.

3.1.5.2 — Trends and Themes

Include any trends or recurring themes that the Independent Evaluator found while assessing utility compliance to Qualitative Goal/Target initiatives.

As shown in the previous section, the array of activities requiring qualitative verification spanned nine of the ten WMP categories. Of these 51 activities, the IE has been able to verify the existence, activity and/or outcomes of 100% of the activities in this category. The following observations, trends and themes emerged from this analysis:

- The organization of the WMP does not reflect the structure of SDG&E departments. Activities described in and monitored under the WMP, and the staff responsible for these, are located in many line departments under line managers.
- WMP activity is unified under the WMP and managed by a cross-departmental team. This team draws managers, staff and in some cases resources from these many departments.
- SMEs are subject matter experts because of their depth in a particular area or subject. In some cases, SMEs are knowledgeable of WMP activities beyond their own specialty; in other cases, they are unable to speak about broader WMP trends or developments.
- Where SME verification of activities was unavailable or unclear, the IE requested additional verification data from SDG&E. This documentation took many forms and is listed in Table 9: Summary of 2020 Qualitative Outcomes in section 3.1.1 Sampling and Methodology.
- Budget targets and actuals for the majority of the 52 qualitative items are challenging to discern as the costs are embedded in the budget for the supporting unit/ department with which the activity is associated. This will be discussed further in section 3.2 Verification of Funding.
- SDG&E has been very responsive in providing requested data and assistance in setting up SME interviews. Qualitative discussions were complete and informative.
- 5.8% of these activities were either not verified or were found to have fallen short of their 2020 targets. These included:
    - 5.3.2.7 – Network Management Situational Awareness – The 2020 target for this activity was to improve the protocols for operational decision-making during extreme events, through the integration of enhanced weather data. By Year-End 2020, the improved situational awareness had not been achieved due to incomplete integration of weather data.
    - 5.3.4.9.3 – Circuit Ownership – This target was met in the qualitative part, as the refresher training was held but subsequent proposals for applicable actions were deemed to be out of scope and not pursued.
    - 5.3.4.10 – Drone Assessments of Transmission Infrastructure. The 2020 target for structures assessed came in at 53% of the 2,679 structures intended. As the first year of this program, 2020 yielded lessons learned in processes and realistic scheduling of effort that will carry forward into subsequent years.

Table 10: Summary of 2020 Qualitative Outcomes

Table 10 -- Summary of 2020 Qualitative Outcomes				
Activity #	**Activity Title**	**2020 Target**	**2020 Actual**	
5.3.1 Risk Assessment and Mapping				
5.3.1.1	Wildfire Risk Reduction Model Operations	Model in use; improved	Activity verified in SME interviews 6/23, 6/25	1
5.3.1.2	10-hour Fuel Projections Generation	Fuel reports generated.	Activity verified via sample report.	2
5.3.1.3	Assessing and Quantification of Ignitions to Grow into Wildfire	Assessments completed	Activity verified in SME interview 6/25	3
5.3.1.4	WRRM Ops to Wildfire Next Generation Modeling (WiNGS)	Integration of WRRM results into WiNGs continues.	Activity verified in SME interview 6/25	4
5.3.1.5	WRRM Ops Simulations in Real-Time and Virtual Ignitions Simulations	Simulations being completed in 2020.	Capability verified via sample report.	5
5.3.1.6	Software Installation for Automatic Download Weather Data from NOAA and Application of Data in WRRM-Ops Weather Forecasts	Data in use in 2020.	Activity verified in SME interviews 6/23, 6/25	6
5.3.1.7	High-Quality Weather Data Generation	High-performance computers used to generate high quality weather data for automated use in operations.	Capability and outcomes verified via follow up documentation	7
5.3.2 Situational Awareness and Forecasting				
5.3.2.4.2	Generation of Fire Potential Index for Wildfire Situational Awareness, Field Personnel and Operation Centers	Semi-automated tool validated daily	Activity verified in SME interview 6/23	8
5.3.2.4.3	Santa Ana Wildfire Threat Index - Training, Data Archive and Validation of SAWTI Output to Large Wildfire Activity	Historical data, updated regularly, deepens insight into future Santa Ana wildfire risk	Activity verified in SME interview 6/23	9
5.3.2.4.4	PSPS Situational Awareness Dashboard - VRI, Historical Wind Conditions, 95th& 99th Percentile Wind Gust	Upgrade of previous Dashboard w new data. Data maintained daily.	Activity verified in SME interview 6/23	10
5.3.2.5	Operating Conditions - FPI, SWATI and observers	Upgraded risk intel to inform protocols, work restrictions in high-risk locations	Activity verified in SME interview 6/23	11
5.3.2.7	Network Management Situational Awareness - Enhanced Visibility for Work Being Done or Planned in HFTD Areas	Improve protocols for operational decisions during extreme weather events.	Weather data is not fully integrated, per SME interview 6/23	12
5.3.4 Asset Management and Inspections				
5.3.4.9.3	Circuit Ownership	Provide refresher training to field personnel and increase submittal rate.	Activity verified in SME interview 6/10 with follow up documentation	13
5.3.4.10	Drone Assessments of Transmission Infrastructure	1,417 of 2,679 structures assessed in 2020, first year of program.	Activity verified in SME interview 6/24	14
5.3.4.14	Monitoring and Auditing of Inspections	Audit of inspections completed and issues resolved.	Completion verified in WMP Compliance report.	15
5.3.5 Vegetation Management and Inspection - Pole Brushing & Fuel Mgmt				
5.3.5.1	Vegetation Management - Community Engagement	Shared WMP information w customers & communities via wildfire safety fairs before 2020 fire season	Activity verified in SME interview 6/25	16
5.3.5.7	LiDAR Inspection of Vegetation Around Distribution Infrastructure and Vegetation Management Technology	Completed pilot to determine feasibility of LiDAR into ongoing vegetation management program.	Activity verified in SME interview 6/25	17
5.3.5.13	Quality Assurance/Quality Control of Inspections	Perform QA/QC of all vegetation mgmt activities.	Activity verified in SME interview 6/25	18

5.3.5.14	Recruiting and Training of Vegetation Management Personnel	Provide all training for internal and contracted vegetation mgmt workforce.	Activity verified in SME interview 6/25	19
5.3.5.16	Hazard Tree Removal and Right Tree-Right Place	Conduct hazard tree operations as required; engage customers on Right Tree-Right Place initiative.	Activity verified in SME interview 6/25	20
5.3.5.19	Tree Database	Upgrade work management system and tree inventory.	Activity verified in SME interview 6/25	21
5.3.6 Grid Operations and Protocols				
5.3.6.1	Recloser Protocols	These protocols exist and are used.	Activity verified in SME Interview 6/23.	22
5.3.6.2	Contract Fire Resources	These resources provide consequence mitigation should an ignition occur.	Activity verified in SME interview 6/23	23
5.3.6.3	Other Special Work Procedures	ESP 113.1 governs all activities at risk of igniting a fire. Updated annually; all field personnel trained annually.	Activity verified in SME interviews 6/23, 6/28	24
5.3.6.4	Protocols for PSPS Re-energization	These protocols exist and are used.	Activity verified in SME interviews 6/10, 6/28	25
5.3.6.5.1	PSPS Protocols	These protocols exist and are used.	Activity verified in SME interviews 6/10, 6/28	26
5.3.6.5.2	Mitigating the Public Safety Impact of PSPS Protocols	Communications & Fire Safety collaborate in training and outreach	Activity verified in SME interviews 6/10, 6/23 and in documentation	27
5.3.6.5.3	PSPS Communication Practices	Extensive customer outreach/ communication conducted.	Activity verified in SME interviews 6/10, 6/23 and in documentation	28
5.3.6.6.1	Aviation Firefighting Program	Capability existed in 2020.	Activity verified in SME interview 6/23 and followup documentation	29
5.3.6.6.2	Industrial Fire Brigade	Prevents/ Responds to fires in substations. Capacity existed in 2020.	Activity verified in SME interview 6/23 and followup documentation	30
5.3.7 Data Governance				
5.3.7.1	Centralized Repository for Data	This repository exists and is in use.	Capability verified in SME interviews 6/23 and 6/28	31
5.3.7.1.2	Geographic Information System Data	This data capability exists and is in use.	Capability verified in SME interviews 6/23 and 6/28	32
5.3.7.2	Collaborative Research on Utility Ignition and/or Wildfire-Innovation Lab and Other Collaboration	Collaborations and research projects continued in 2020 and in 2021.	Program verified in SME interview 6/25	33
5.3.7.3	Wildfire-related Data and Algorithms	Data Governance Framework (DGF) created; business unit DFGs completed	Capability verified in SME interview 6/23	34
5.3.7.4.1	Ignition Management Program	Program is in place in 2020 and 2021.	Program activity verified via follow-up documentation.	35
5.3.7.4.2	Reliability Database	Database maintains customer outage impact data for multiple uses.	Program activity verified via follow-up documentation.	36
5.3.8 Resource Allocation Methodology				
5.3.8.1	Asset Management	Development of Asset Mgmt program has begun, continues in 2021.	Activity verified in SME interview 6/28	37
5.3.8.3	Risk Spend Efficiency Analysis	Continued use and refinement of the R-S-E metric.	Activity verified in SME interview 6/24	38
5.3.8.4.1	Wildfire Mitigation Engineering Team	Continuation of specialized capabilities to quickly address ignition events.	Capability verified via SME interview 6/23 and followup documentation.	39
5.3.8.4.2	PSPS Mitigation Engineering Team	Segment-by-segment review of circuits prone to PSPS	Capability verified via followup documentation.	40

5.3.9 Emergency Planning and Preparedness				
5.3.9.1	Overview of Emergency Preparedness Plan	Overview exists in 2020 WMP	Completion verified in SME interview 6/28	41
5.3.9.2	Overview of Customer Support in Emergencies	Overview exists in 2020 WMP	Completion verified in SME interview 6/28	42
5.3.9.3	Coordination with Public Safety Partners	Continued collaboration & communications with external partners	Activity verified in SME interview 6/28	43
5.3.9.4.1	Adequate and Trained Workforce for Service Restoration	Training for internal & external groups conducted, 338 sessions reaching 6,580 participants in 2020.	Activity verified in SME interview 6/23	44
5.3.9.4.4.1	Company Emergency Response Plan Overview	Overview exists in 2020 WMP	Completion verified in SME interview 6/28	45
5.3.9.4.5	Mutual Assistance and Contractors	Mutual assistance capability has existed for years; wasn't activated in 2020	Capability verified in SME interview 6/28 and via documentation.	46
5.3.9.4.6	After Action Reports	After-action debriefs are a long-standing practice and continued in 2020.	Practice verified in SME interview 6/28 and	47
5.3.9.4.7	Other - Emergency Management Operations	Continuing capability to manage emergency operations.	Capability verified in SME interview 6/28.	48
5.3.10 Stakeholder Cooperation and Community Engagement				
5.3.10.1	Community Outreach and Public Awareness	Events are held & pre- post awareness systematically evaluated.	Activity verified in SME interview 6/10 & documentation	49
5.3.10.2	Cooperation and Best Practice Sharing with Agencies Outside CA	Continuation of long-standing practice of informartion sharing and collaboration with major fire-related agencies.	Activity verified through SME interviews and budget spend.	50
5.3.10.3	Cooperation with Suppression Agencies	Strong relationships continued w all first responder agencies in service territory.	Activity verified in SME interview 6/23	51
			Verification % =	100%
				0.05882

3.2 — Verification of Funding

The Verification of Funding section should document all instances in which WMP activities were funded less than 100 percent. For all such instances, the Independent Evaluator shall request and document utility explanation of such instances.

To build the financial summaries in this section, the IE team drew on two sources: the WMP for description of the categories and activity targets, and a 2020 year-end summary of activity and spend provided by SDG&E [8]. The charts are built to parallel the four activity sections in section 3.1 to aid cross-referencing against the activity summations, themes, and trends in those sections.

Funding verification is provided for each of the four activity categories in the sections that follow. Each section ends with a summary of SDG&E's explanation for the budget shortfalls verified.

3.2.1 – Large Quantitative Field Verifiable

Under Large Volume Quantitative – Field Verifiable, there are a total of 17 different activities in four of the ten WMP categories. Of these 17, ten exceeded their planned WMP budget while three were underspent and four had insufficient data. Please see a summary of activities and budget performance in Table 11 below.

Table 11: Large Volume Quantifiable Field Verifiable Activities Budget Variance

Table 11 - Large Volume Quantifiable Field Verifiable Activities Budget Variance								
Category #	Category	Activity#	Activity	Capital ($000)		O&M ($000)		% Budget
				Target	Actual	Target	Actual	
5.3.2	Situational Awareness & Forecasting	5.3.2.3	Wireless Fault Indicators	$ 630	$ 835	n/a	n/a	133%
5.3.3	Grid Design & System Hardening	5.3.3.3	Distribution Overhead System Hardening - Covered Conductor	$ 1,071	$ 1,798	n/a	n/a	168%
		5.3.3.3	Distribution Overhead System Hardening - OH	$ 87,000	$ 138,378	n/a	$ 3,446	159%
		5.3.3.7	Expulsion fuse replacement	$ 3,737	$ 6,521	n/a	n/a	174%
		5.3.3.10	Hotline Clamps	$ 3,000	$ 3,299	n/a	n/a	110%
		5.3.3.16	Strategic Undergrounding	$ 31,000	$ 38,850	n/a	n/a	125%
		5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission OH	$ 5,871	$ 5,030	n/a	n/a	86%
		5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission UG					
		5.3.3.17.1	Overhead Transmission Fire Hardening - Distribution Underbuilt					
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Transmission OH					
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH	$ 35,000	$ 46,271	n/a	n/a	132%
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution OH w/associated Transmission mileage					
		5.3.3.17.2	Cleveland National Forest Fire Hardening - Distribution UG	$ 30,000	$ 37,973			127%
5.3.4	Asset Management & Inspections	5.3.3.6	Pole Replacement and Reinforcement	$ 10,568	$ 10,925	n/a	n/a	103%
5.3.5	Vegetation Management & Inspections	5.3.5.5	Fuels Management			$ 5,000	$ 5,805	116%
		5.3.5.9	Enhanced inspections, patrols, and trims			$ 23,603	$ 10,235	43%
		5.3.5.20	Pole brushing			$ 5,943	$ 5,433	91%

Table 12 highlights four areas of variance. Table 12 summarizes SDG&E's explanation for these results.

Table 12: Large Volume Quantifiable Field Verifiable Activities Variance Explanation

Table 12 - Large Volume Quantifiable Field Verifiable Activities Variance Explanation					
Category #	Category	Activity#	Activity	% Budget	SDG&E Variance Explanation
5.3.3	Grid Design and System Hardening	5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission OH	86%	Underage tied to the reduction in miles hardened in 2020, a reduction from 21.5 miles (target) to 19.7 miles (actual)
		5.3.3.17.1	Overhead Transmission Fire Hardening - Transmission UG		
5.3.5	Vegetation Management & Inspections	5.3.5.9	Enhanced inspections, patrols, and trims	43%	2020 forecast included both fuels management and enhanced trim, now split apart
		5.3.5.20	Pole brushing	91%	no explanation provided

3.2.2 – Large Quantity Non-Field Verifiable Activities

Of the 12 activities in this category, Table 13 below shows that six of these met or exceeded their budget targets while six did not (5.3.4.2 – Transmission System inspections is treated as a single activity despite the four types of inspections)

Table 13: Large Volume Field Non-Verifiable Budget Variance

Table 13 - Large Volume Field Non-Verifiable Budget Variance									
Category #	Category	Activity #	Activity	Units	Capital ($000)		O&M ($000)		% Budget
					Target	Actual	Target	Actual	
5.3.3	Grid Design & System Hardening	5.3.3.11.1	Customer Resiliency Programs	Generators	Total cost includes CRCs & generators leased in customer resilience		3,340	6,370	191%
		5.3.3.11.2	Expanded generator grant program				4,870	761	16%
		5.3.3.11.3	Whole house generator program				250	1,754	702%
5.3.4	Asset Management & Inspections	5.3.4.1	Detailed corrective maintenance program inspections	Inspections			1,257	1,062	84%
		5.3.4.2	Transmission System Inspections - Visual	Inspections (Visual)		838			
			Transmission System Inspections - Infrared	Inspections (Infrared)					
			Transmission System Inspections - Detailed	Inspections (Detailed)					
			Transmission System Inspections - Aerial	Inspections (Aerial 69kV)					
		5.3.4.4	Infrared inspections of distribution infrastructure	Inspections			245	175	71%
		5.3.4.6	Intrusive pole inspections - distribution		Cost tracked within Pole Replacement program				
		5.3.4.9.1	HFTD Tier 3 Inspections				368	400	109%
		5.3.4.9.2	Drone assessments of distribution infrastructure		3,600	15,901	50,500	51,953	103%
		5.3.4.11	Patrol inspections of distribution poles - CMP				295	295	100%
		5.3.4.15	Substation System Inspection		Costs are tracked as FERC $; not included in WMP				
5.3.5	Vegetation Management & Inspections	5.3.5.2	Detailed inspections of vegetation around distribution infrastructure - tree trimming				27,776	57,791	208%

Significant variation occurs among the spend levels in this category, from 16% of budget spent for the expanded generator grant program versus seven *times* the spend planned for the whole house generator program. SDG&E's explanations for these variances are shown in Table 14 below, Large Volume Quantifiable Non-Field Verifiable Variance Explanation.

Table 14: Large Volume Field Non-Verifiable Variance Explanation

Table 14 - Large Volume Field Non-Verifiable Variance Explanation						
Category #	Category	Activity #	Activity	Units	% Budget	
5.3.3	Grid Design & System Hardening	5.3.3.11.2	Expanded generator grant program	Generators	16%	Variance reflects how the three customer generator programs are categorized and implemented. Combining actual v target for 3 exceeds target 5%
5.3.4	Asset Management & Inspections	5.3.4.1	Detailed corrective maintenance program inspections	Inspections	84%	With an increase non-routine inspection requests, a portion of routine inspections was moved to 2021 to accommodate the unplanned increase in workload.
		5.3.4.2	Transmission System Inspections - Visual	Inspections (Visual)		In 2020, SDG&E replaced 72 transmission poles in the HFTD, of which 34 had distribution underbuilt. SDG&E also completed design of seven more transmission poles with distribution underbuilt that have not yet been constructed.
			Transmission System Inspections - Infrared	Inspections (Infrared)		
			Transmission System Inspections - Detailed	Inspections (Detailed)		
			Transmission System Inspections - Aerial	Inspections (Aerial 69kV)		
		5.3.4.4	Infrared inspections of distribution infrastructure	Inspections	71%	Underspent as a result of 7,000 distribution infrared inspections when target was 8,500.
		5.3.4.6	Intrusive pole inspections - distribution			Costs for this program are tracked within the Pole Replacement and Reinforcement program.
		5.3.4.15	Substation System Inspection			Substation inspection costs are tracked as FERC dollars and are not included in the WMP.

3.2.3 – Small Quantity Activities

The twelve activities in this category are summarized in section 3.1.4. Budget verification for this cluster of activities is provided in Table 15 – Small Volume Quantifiable Budget Variance below:

Table 15: Small Volume Quantifiable Budget Variance

Table 15 - Small Volume Quantifiable Budget Variance									
Category #	Category	Activity #	Activity	Units	Capital ($000)		O&M ($000)		% Budget
					Target	Actual	Target	Actual	
5.3.2	Situational Awareness and Forecasting	5.3.2.1	Camera Networks	Cameras	775	1,083			140%
			Weather Stations	Weather Stations					
		5.3.2.4.1	Fire Science and Climate Adaptation Dept	Fire Science and Innovation Lab	4,500	608	2,500	3,363	57%
5.3.3	Grid Design and System Hardening	5.3.3.1	SCADA Capacitors	SCADA Capacitors	1,575	992			63%
		5.3.3.2	Advanced Protection	Circuits	5,300	9,119			172%
				Substations					
		5.3.3.8.1	PSPS Sectionalizing enhancements	Switches	550	5,111			929%
		5.3.3.8.2	Microgrids	Microgrids	11,340	3,542			31%
		5.3.3.11.1	Customer Resiliency Programs	Community Resource Centers			3,340		n/a
				Generators Leased					
		5.3.3.18.1	Distribution Communications Reliability Improvements	Stations	31,500	35,473			113%
		5.3.3.18.2	Lightning arrestor removal and replacement	n/a					

This table shows that of the twelve activities in this category, seven met or exceeded their target budgets, while five categories did not. Table 16 (below) – Small Volume Quantifiable Budget Explanation provides SDG&E's explanations for these shortfalls, as drawn from their 2020 WMP Compliance Report – 04-01-2020.

Table 16: Small Volume Quantifiable Variance Explanation

Table 16 - Small Volume Quantifiable Variance Explanation						
Category #	Category	Activity #	Activity	Units	% Budget	SDG&E Variance Explanation
5.3.2	Situational Awareness	5.3.2.4.1	Fire Science and Climate Adaptation Dept	Fire Science and Innovation Lab	57%	Due to Covid-19. Additional O&M costs due to change in cost allocation methods.
5.3.3	Grid Design and System Hardening	5.3.3.1	SCADA Capacitors	SCADA Capacitors	63%	Underspend due to timing of 2020 work.
		5.3.3.8.2	Microgrids	Microgrids	31%	Underspent due to Covid-19 related delates in permits and securing storage equipment
		5.3.3.11.1	Customer Resiliency Programs	Community Resource Centers	n/a	Overage due to how the three customer programs were categorized and implemented
				Generators Leased		
		5.3.3.18.2	Lightning arrestor removal and replacement	n/a	n/a	No explanation provided.

3.2.4 – Qualitative Activities

Budget verification was most challenging in the case of the activities in the qualitative category. Of the 51 activities, only seven of these provided enough budgetary information to enable verification against plans. The balance of these measures – 44 in all – either provided partial budget information or no breakout at all. In the latter case, this reflects the fact that budgeted spend for either capital, O&M or both, was embedded in the budget of a separate organizational unit. The complete verification of 2020 spend for all activities in this category is provided in section 3.1.5.1 – Review of Initiatives.

Table 17 below summarized the budget variances found in this category.

Table 17: Qualitative Activities Budget Variance

Table 17 - Qualitative Activities Budget Variance									
Category #	Category	Activity#	Activity	Capital ($000)		O&M ($000)		% Budget
				Target	Actual	Target	Actual	
5.3.1	Risk assesment and mapping	5.3.1.1	Summarized risk map: Operational Wildfire Risk Reduction Model	$ 1,400	$ 1,191			85%
5.3.6	Grid operations and protocols	5.3.6.2	Wildfire infrastructure protection teams - contract fire resources			$ 1,668	$ 1,294	78%
		5.3.6.6.1	Aviation firefighting program	$ 7,200	$ 7,092	$ 7,961	$ 6,766	91%
5.3.8	Resource allocati on methodology	5.3.8.1	Asset management	$ 9,697	$ 1,623	$ 450	$ 329	19%
		5.3.8.4.1	Wildfire mitigation personnel			$ 1,838	$ 3,389	184%
5.3.9	Emergency planning and preparedness	5.3.9.4.7	Other - Emergency management operations	$ 4,500	$ 2,140	$ 4,821	$ 12,214	154%
5.3.10	Stakeholder cooperation and community	5.3.10.2	Cooperation and best practice sharing with agencies outside California			$ 4,928	$ 8,227	167%

Table 18: Qualitative Activities Variance Explanation

Table 18 - Qualitative Activities Variance Explanation					
Category #	Category	Activity#	Activity	% Budget	SDG&E Variance Explanation
5.3.1	Risk assesment and mapping	5.3.1.1	Summarized risk map: Operational Wildfire Risk Reduction Model	85%	Underspending related to the software vendor that builds and maintains WRRM-Ops model
5.3.6	Grid operations and protocols	5.3.6.2	Wildfire infrastructure protection teams - contract fire resources	78%	Costs associated with wildfire protection teams are tracked separately during red flag warnings, of which there were multiple in 2020
		5.3.6.6.1	Aviation firefighting program	91%	Underspend reflects efficiencies in contract costs related to AirCrane helicopter and lower than expected monthly costs.
5.3.8	Resource allocation methodology	5.3.8.1	Asset management	19%	Variance attributed to reallocation to Data Governance of funds related to cost for a centralized data repository.

Of the seven activities showing a variance against their 2020 WMP budget, four of these were underspent and three were overspent. The four underspent activities are shown in Table 18 with SDG&E's explanation.

In the balance of this reporting period, further attention will be directed to exploring the reasons for these shortfalls.

Table 19: 2020 WMP Funding Verification Summary

Initiative Category	2020 Initiative Number	Initiative Name	2020 WMP Page Number	Funding Discrepancy Amount	Detail on Funding Discrepancy
Grid Design & System Hardening	5.3.3	Overhead Transmission Fire Hardening - Transmission OH	SDG&E's Compliance Report, 3/31/2021	$841,000	Utility proposed spending $5,871,000.00 in its 2020 WMP but actually spent $5,030,000.00
Vegetation Management& Inspections, Trim/Remove	5.3.5.9	Enhanced inspections, patrols, and trims	SDG&E's Compliance Report, 3/31/2021	$13,368,000.00	Utility proposed spending $23,603,000.00 in its 2020 WMP but actually spent $10,235,000.00
Vegetation Management & Inspections, Pole Brushing	5.3.5.20	Pole brushing	SDG&E's Compliance Report, 3/31/2021	$510,000.00	Utility proposed spending $5,943,000.00 in its 2020 WMP but actually spent $5,433,000.00

Grid Design & System Hardening	5.3.3.11.2	Expanded generator grant program	SDG&E's Compliance Report, 3/31/2021	$4,109,000.00	Utility proposed spending $4,870,000.00 in its 2020 WMP but actually spent $761,000.00
Asset Management & Inspections	5.3.4.4	Infrared inspections of distribution infrastructure	SDG&E's Compliance Report, 3/31/2021	$70,000.00	Utility proposed spending $245,000.00 in its 2020 WMP but actually spent $175,000.00
Grid Design & System Hardening	5.3.2.4.1	Fire Science & Innovation Lab	SDG&E's Compliance Report, 3/31/2021	$3,029,000.00	Utility proposed spending $7,000,000.00 in its 2020 WMP but actually spent $3,971,000.00
Grid Design & System Hardening	5.3.3.1	SCADA Capacitors	SDG&E's Compliance Report, 3/31/2021	$583,000.00	Utility proposed spending $1,575,000.00 in its 2020 WMP but actually spent $992,000.00
Grid Design & System Hardening	5.3.3.8.2	Microgrids	SDG&E's Compliance Report, 3/31/2021	$7,427,000.00	Utility proposed spending $11,340,000.00 in its 2020 WMP but actually spent $3,913,000.00

3.3 — Verification of QA/QC Programs

This section should include a detailed description of all QA and QC programs that the Independent Evaluator validated during its compliance review. Independent Evaluators shall review all documentation and perform interviews to validate an electrical corporation's QA and QC programs for WMP compliance.

Due to the compressed evaluation period, the IE was not able to conduct a comprehensive review and analysis of SDG&E's QA/QC programs. That these programs exist was verifiable in the following ways:

- Reference in WMP outcome reports [9] to QA/QC programs. For example, WMP 5.3.4.14 – Monitoring and Auditing of Inspections states SDG&E's intention to continue QA/QC of inspections.
- The company's report of this activity states that their 2020 plan was to audit 1.5% "of the combined inspections" in 2020. The year-end summary of 5.3.4.14 was that "all of the audits of GO165 overhead detailed inspections" were completed and "overall result was positive, with very few additional findings discovered." [10]. The IE was not able to independently verify these results during this time period.
- Anecdotal reference to QA/QC programs was made during related SME interviews. The IE team followed up with a request for verification documentation under 5.3.5.14 – Monitoring and Auditing

of Inspections. The IE received copies of all QA/QC reports from one district for the 2020 WMP period, however the compressed time period for this evaluation did not allow content analysis of those reports.

4. Conclusion

The Conclusion section shall summarize all findings that the Independent Evaluator detailed in the sections above. Fill out the table below with all findings.

The IE team was pleased to complete this evaluation of SDG&E's WMP compliance for the year 2020. Our detailed findings are summarized in the Trends and Themes sections for each of the four activity categories.

Overall, SDG&E has provided a strong push to achieve compliance to the WMP in Tiers 2 and 3. The hardest push was throughout Tier 3, from the most populated areas, working down from major transmission and distribution lines. WMP activity has consisted of strategic underground limiting/sectioning of circuits, and hardening complete poles with steel, fuses, hot clamps, cross arms, and limiters.

With the caveat that the findings from this report, while based on random samples following best evaluation and sampling practices, nonetheless represent a small sample of SDG&E's overall activity in these areas. Inferences and generalizations based on these samples must be drawn with care.

Highlights and key findings from the IE's evaluation of the four categories of WMP activity include:

- **Funding**: Section 3.2 highlights the most notable financial shortfall identified, a shortfall of $13M in the area of 5.3.5.9 - Vegetation Management and Inspections - Trim/Remove. We also note that SDG&E funding exceeded WMP planned spending in multiple areas. These are shown in the charts in section 3.2.
- **Activity:** Many areas of SDG&E's WMP met or exceeded targeted activity levels. However, shortfalls were found in several areas. These include:
  - Areas of the IE's inspections showed large investment in the SDG&E's infrastructure, in keeping with the objectives of the WMP. In the HFTD, poles have been replaced with steel poles and all aspects such as cross arms, fuses, fuel management, and covered conductors have been set up to meet the WMP's Grid Design and System Hardening targets.
  - The location of SDG&E distribution assets was found during IE inspections to be frequently imprecise, at a rate that merits further exploration. SDG&E's Asset Management program (5.3.8.1), a new program in 2020, will benefit from additional attention and investment in 2021.
  - Our assessment of vegetation work orders raised multiple questions. Work orders showing multiple items on the same work order for the same work type. Further analysis is needed to ascertain whether work order practices need to be tightened to improve both efficiency and/or tighten contracted costs. This will change the number of total WMP items for the 2020 year.
- **QA/QC --** Work was completed and performed in compliance with GO 165, PRC 4292, PRC 4293, CPUC GO 95, and GO 128. Areas sampled and evaluated by IE inspection are described in 3.1.1 - Sampling and Methodology.

Table 20: IE Findings Summary

SOW Category	2020 Initiative Number	Initiative Name	Finding	Detail on finding
Verification of Funding	5.3.5.9	Vegetation Management & Inspections, Trim/Remove	Largest gap of spending by $13,368,000.00	Utility spent $13,368,000.00 less in 2020 than reported in Compliance Report
WMP Activity Completion	5.3.4	Pole replacement and Reinforcement	Did not meet quantifiable goal/target even after surpassing allocated budget	Utility fell short of target by 72 poles

Finally, despite the compressed schedule for this work, SDG&E staff was very responsive and complete in their replies to IE data requests. Support from the WMP program manager enabled the IE to evaluate the WMP as fully as possible within the allotted time frame.

That said, the IE recommends that several requirements from the CPUC's WSD that made this assignment additionally challenging, during this compressed time period, should be revised. Document tracking requirements, requested to enable WSD staff to track every edit made in real-time, made it extremely difficult for the IE to prepare its final report with efficiency. While many of WSD's comments and recommendations were helpful, the challenges imposed by the required tracking of IE's final report was a significant constraint on our limited time.

5. Appendix

The Appendix can include:

- *Electrical corporation's list of Large Volume Quantifiable Goal/Target – Field Verifiable initiatives*
- *Electrical corporation's list of Large Volume Quantifiable Goal/Target – Not Field Verifiable initiatives*
- *Electrical corporation's list of Small Volume Quantifiable Goal/Target initiatives*
- *Electrical corporation's list of Qualitative Goal/Target initiatives*
- *Electrical corporation's complete listing and description of existing QA/QC programs in place*
- *Data requests and interview requests*
- *Samples chosen by the Independent Evaluator*
- *Financial audit reports and memorandum accounts*
- *Any additional documentation*

SDG&E Work Plan-Multispectral Satellite Methodology

WMP Tables 1 through 31: https://app.box.com/s/6oi6l9c7lnzwz415gz745j2vnqj3feg6

SDG&E Distribution Line Area (NDVI Base Map):
https://app.box.com/s/9ykkpcn3udoiuoz3wdow4db4yps3crru

WMP Quarterly Initiative Update: https://app.box.com/s/1wr4kp1sxw916n5223mf01v6tv2gf30l

SDG&E 2020 WMP: *https://app.box.com/s/70yn6sg1reqpyg7c0jrw1tst7qef6ngq*

WMP Tables: https://app.box.com/s/6oi6l9c7lnzwz415gz745j2vnqj3feg6

WSD Source Data Analysis: https://app.box.com/s/z30rx2g6lx0g7xx7km78r5wnjs4ssisa

Inspection Tracking for WSD System Hardening:
https://app.box.com/s/ufq6qc1x5zy8hobtv0awdzztb8lv4w5r

Inspection Tracking for WSD Vegetation Management:
https://app.box.com/s/9zt0yiab02w4haaw2unyuww9t6yv3g6e

Field Verifiable Inspection Run List: https://app.box.com/s/h357x2i5tsuji3f05s6taqtacrpffq2j

6.Works Cited

[1] San Diego Gas & Electric Company Wildfire Mitigation Plan February 7, 2020, (Rev 1 March 2, 2020), hereinafter referred to as "WMP."
[2] System hardening" refers to many different activities, including but not limited to replacement of uncovered conductors, expulsion fuses, and other components with known ignition potential, as well as replacement of wood poles with steel poles and related activities in areas of high fire risk.
[3] Ibid.
[4] Public Utilities Commission of the State of California, Resolution WSD-002, Wildfire Safety Division, June 11, 2020.]
[5] https://sentinel.esa.int/web/sentinel/missions/sentinel-2
[6] Jin, Y., Goulden, M., Faivre, N., Veraverbeke, S., Sun, F., Hall, A., Hand, M., Hook, S., Randerson, J., (2015), Identification of two distinct fire regimes in Southern California: implications for economic impact and future change, Environmental Research Letters, volume 10, number 9. 4. CPUC Fire Safety Rulemaking Background https://www.cpuc.ca.gov/firethreatmaps/
[7] SDG&E work order vs. 4LEAF inspector reports
[8] WMP Financial Results_2020-12.xls
[9] SDG&E 2020 Wildfire Mitigation Plan Compliance Report, March 31, 2020
[10] Ibid., page 51