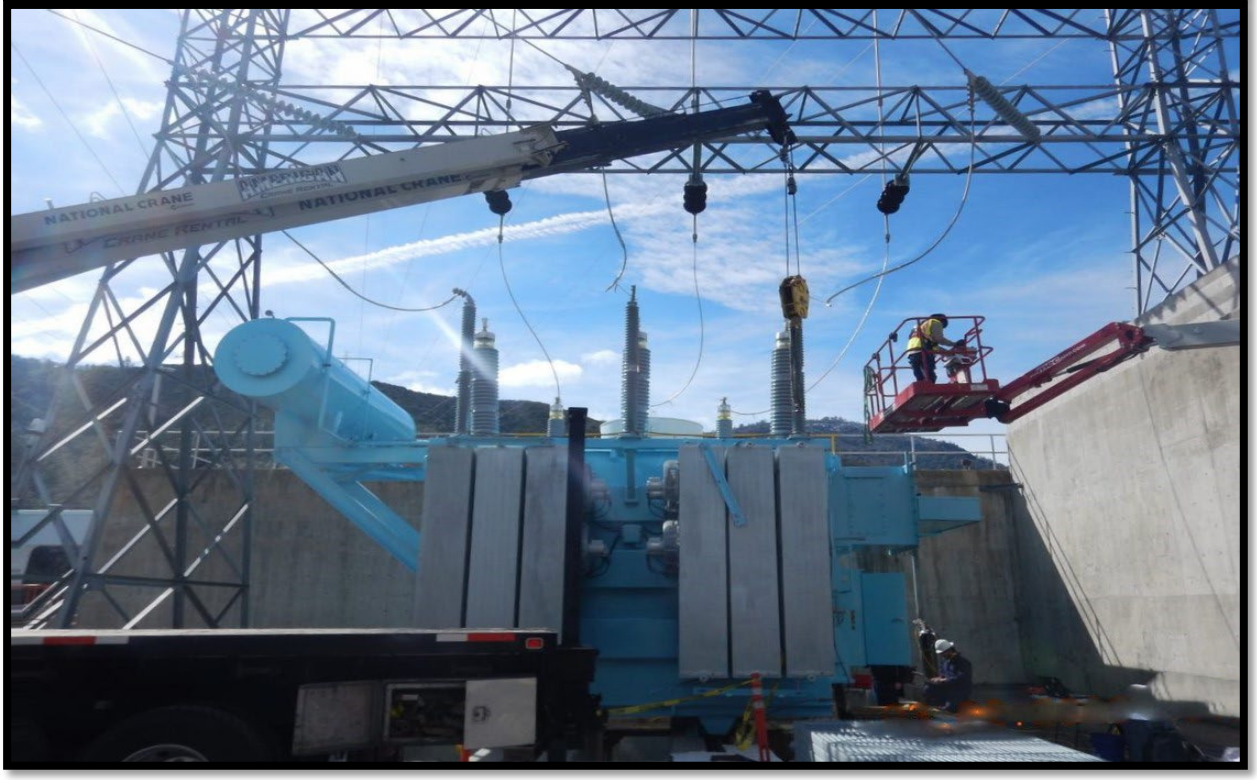
SAN FRANCISCO PUBLIC UTILITIES COMMISSION
2023
WILDFIRE MITIGATION PLAN



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ACRONYMS	
AGM	Assistant General Manager
AI	Artificial Intelligence
AVMWP	Annual Vegetation Management Work Plan
BLM	Bureau of Land Management
BMP	Best Management Practice
CAISO	California Independent System Operator
CAL FIRE	California Department of Forestry and Fire Protection
CCSF	City and County of San Francisco
Commission	San Francisco Public Utilities Commission (SFPUC) Commission
CM	Corrective Maintenance
CMMS	Computerized Maintenance Management System. SFPUC utilizes Maximo (IBM™) as our enterprise CMMS.
CPUC	California Public Utilities Commission
CUEA	California Utility Emergency Association
C5	Climate Change Collaboration and Coordination Committee
e-Logger	Electronic Logger used by Hetch Hetchy Water to collect, store, and distribute real-time data about
ESF	Emergency Support Functions
ESO	Electrical Safety Orders, State of California
FPI	Fire Potential Index
FAC-003-4	NERC Reliability Standard: Transmission Vegetation Management
FY	Fiscal Year
GO	CPUC General Order

ACRONYMS	
HFT / HFTD	High Fire Threat / High Fire Threat District
HHWP	Hetch Hetchy Water and Power
HHWPP	Hetch Hetchy Water and Power Project, or HHWP Project
HHW	Hetch Hetchy Water. The Division of Hetch Hetchy Water and Power that is managed by the Water Enterprise. Commonly referred to as Hetch Hetchy Water and Power.
HHZ	High Hazard Zone
HRRR	NOAA's High-Resolution Rapid Refresh Model
IAP	Incident Action Plan
IC	Incident Commander
ICS	Incident Command System
IE	Independent Evaluator
IOU	Investor-Owned Utility
ISA	International Society of Arboriculture
IVM	Integrated Vegetation Management
kV	Kilovolt (1,000 volts)
LiDAR	Light Detection and Ranging - Survey technology for the evaluation of existing overhead electrical lines
LiveEO	Software that provides artificial intelligence satellite observation data specific to infrastructure assets, such as overhead electrical lines.
LTO	Licensed Timber Operator
Maximo	Maximo (IBM™) SFPUC's enterprise Computerized Maintenance Management System or CMMS
MID	Modesto Irrigation District
MVCD	Minimum Vegetation Clearance Distance
NEC	National Electric Code

ACRONYMS	
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRF	National Response Framework
NRLM	Natural Resources and Lands Management, a division of the Water Enterprise.
NWS	National Weather Service
OEIS	Office of Energy Infrastructure Safety (or Energy Safety) was established on July 1, 2021, to ensure electrical utilities are taking effective actions to reduce utility-related wildfire risk.[1]
OH	Overhead
PAL	Project Activity Level
PG&E	Pacific Gas & Electric
PIO	Public Information Officer
Plan	Wildfire Mitigation Plan
PM	Preventative Maintenance
POU	Publicly Owned Utility
PRC	Public Resources Code
PSPS	Public Safety Power Shutoff
PUC	Public Utilities Code
QEW	Qualified Electrical Worker
RAWS	Remote Automatic Weather Station – RAWS provides timely local weather data used primarily in fire management

[1] https://energysafety.ca.gov/who-we-are/about-energy-safety/

ACRONYMS	
RFW	Red Flag Warning – Issued by the National Weather Service when warm temperatures, very low humidity, and stronger winds are forecasted and combined are expected to produce an increased risk of fire danger
ROW	Right of Way
SCADA	Supervisory Control and Data Acquisition
SEMS	Standardized Emergency Management System
SFPUC	San Francisco Public Utilities Commission
SRA	State Responsibility Area
SVWTP	Sunol Valley Water Treatment Plant
SWIFT	Southwest Interface Team
TRAQ	ISA Tree Risk Assessment Qualified
TVMP	Transmission Vegetation Management Program
UC	Unified Command
USFS	United States Forest Service
WMP	Wildfire Mitigation Plan
WMRA	Wildfire Mitigation & Recovery Analyst
WSAB	Wildfire Safety Advisory Board
WSTD	Water Supply & Treatment, a division of the Water Enterprise.

1. EXECUTIVE SUMMARY / INTRODUCTION

The San Francisco Public Utilities Commission's (SFPUC) mission is to provide our customers with high-quality, efficient, and reliable power, water, and sewer services in a manner that is inclusive of environmental and community interests and that sustains the resources entrusted to our care.

We adopted the Wildfire Mitigation Plan (WMP or Plan) template recommended by the Wildfire Safety Advisory Board (WSAB) for our 2023 Plan which builds upon the successes and learnings of our previous WMP programs and initiatives and incorporates lessons learned to date from annual WMPs prepared from 2020-2022.

We are committed to building, maintaining, and operating a safer and more resilient electrical grid. SFPUC-owned and operated assets are described in Table 1 which includes transmission and distribution line assets, substations, and hydro generation with an allocation of assets within and outside the California Public Utilities Commission's (CPUC) designated High Fire Threat District (HFTD). HFTDs are areas considered to be of elevated or extreme wildfire risk within the State of California where there is a higher risk for power line fires igniting and spreading rapidly.

This WMP addresses the following 17 requirements as identified within the WSAB 2023 Advisory Opinion for Publicly Owned Utilities (POU) (Figure 1).

Figure 1 – WSAB WMP Requirements

A	Staff responsibilities	G	Community notification	L	Identify enterprise-wide risk
B	General objectives	H	Vegetation management	M	Restoration of service
C	Program descriptions	I	Infrastructure inspections	N(i)	Monitoring & auditing of WMPs
D	Evaluation metrics	J(i)	Grid design, construction & operation risks	N(ii)	Identifying and correcting deficiencies
E	Lessons learned, metrics application	J(ii)	Vegetation, topographic, & climate risks	N(iii)	Monitoring asset inspections
F	Protocols for reclosers, de-energization, and PSPS mitigation	K	Identification and expansion of higher wildfire threat areas		

1.1 Utility Description and Context Setting Table

The SFPUC, a department of the City and County of San Francisco (CCSF), provides power to the residents and businesses of San Francisco through the CleanPowerSF[2] (Community Choice Aggregation) program and serves CCSF municipal load through Hetch Hetchy Power. Additionally, the SFPUC provides retail drinking water and wastewater services to the City of San Francisco and wholesale water to three Bay Area counties.

The SFPUC is comprised of six business functions, or enterprises, including the Water Enterprise. The Water Enterprise has six divisions, including HHW, Water Supply & Treatment Division (WSTD), and Natural Resources and Lands Management (NRLM) (Figure 3). Each of these divisions has defined responsibilities for managing and maintaining the electrical assets described in this Plan. The Water Enterprise is responsible for the development, execution, and oversight of this WMP.

The HHW, WSTD, and NRLM divisions of the Water Enterprise maintain and operate assets from Hetch Hetchy Reservoir in Yosemite National Park to the CCSF County line. HHW is responsible for managing, operating, and maintaining the Hetch Hetchy Water and Power (HHWP) Project. The HHWP Project consists of power generation facilities, electric transmission and distribution assets, water storage and conveyance systems, roads, bridges, and ancillary facilities. These assets originate at the Hetch Hetchy Reservoir, located in Yosemite National Park, traverse the counties of Tuolumne, Mariposa, Stanislaus, and San Joaquin, and span to the East Bay communities of Sunol and Newark in Alameda County. WSTD is responsible for managing, operating, and maintaining the Bay Area portion of the System which includes water storage, treatment, and water transmission facilities in Alameda and San Mateo counties. The SFPUC owns the watersheds above reservoirs in Alameda and San Mateo counties. NRLM Division is responsible for managing, operating, and maintaining these watersheds.

[2] https://www.cleanpowersf.org/

The HHWP Project consists of four hydroelectric powerhouses (generator facilities). HHWP transmits this power through SFPUC-owned and operated 230kV and 115kV transmission lines to the California electric grid. The SFPUC transmits this power through SFPUC-owned and operated transmission lines to the California electric grid. A portion of the transmission facilities are within Pacific Gas & Electric's (PG&E) and Modesto Irrigation District's (MID) service territory. A detailed breakdown of overhead lines in the HFTD is included in Table 1.

The SFPUC owns, operates, and maintains distribution lines operated at various voltage levels with distribution lines providing service to SFPUC-owned and operated facilities. Additionally, a small number of the SFPUC distribution facilities located within PG&E's service territory are connected to PG&E's primary distribution circuits. HHW manages, operates, and maintains the distribution lines within the HHWP Project. WSTD and NRLM manage, operate, and maintain distribution lines that serve SFPUC water treatment plants and facilities within SFPUC watersheds in the Bay Area. Detailed overhead circuit miles in the HFTD are included in Table 1.

Table 1 – Context Setting Table SFPUC

Utility Name	**San Francisco Public Utilities Commission** All line lengths are defined as circuit miles	
Service Territory Size	The SFPUC is primarily a generation (hydro) and transmission provider. The SFPUC has no defined "service territory" with boundaries like a traditional utility serving distribution load.	
Owned Assets	Transmission, Distribution, and Generation	
Number of Customers Served	Two (2) customer accounts served from a distribution line in Tier 2 High Fire Threat District (HFTD) and one (1) in the non-HFTD.	
Population Within Service Territory	N/A	
Customer Class Makeup	Number of Accounts	Share of Total Load (MWh)
	0% Residential; 0% Government; 0% Agricultural; 100% Small/Medium Business; 0% Commercial/Industrial	N/A

Utility Name	San Francisco Public Utilities Commission All line lengths are defined as circuit miles
Service Territory Location/Topography[3]	4% Agriculture 27% Barren/Other 25% Conifer Forest 0% Conifer Woodland 0% Desert 3% Hardwood Forest 16% Hardwood Woodland 18% Herbaceous 0% Shrub 7% Urban 0% Water
Service Territory Wildland Urban Interface[4] (based on total area)	1% Wildland Urban Interface; 1% Wildland Urban Intermix; The percentages above refer to overhead transmission and distribution line miles.

[3] This data was determined by using the California Department of Forestry and Fire Protection, California Multi-Source Vegetation Layer Map, depicting WHR13 Types (Wildlife Habitat Relationship classes grouped into 13 major land cover types) *available at*: https://www.arcgis.com/home/item.html?id=b7ec5d68d8114b1fb2bfbf4665989eb3.

[4] This data was determined by using the definitions and maps maintained by the United States Department of Agriculture, as most recently assembled in *The 2010 Wildland-Urban Interface of the Conterminous United States*, *available at* https://www.fs.usda.gov/nrs/pubs/rmap/rmap_nrs8.pdf

<table>
<tr><th>Utility Name</th><th>San Francisco Public Utilities Commission
All line lengths are defined as circuit miles</th></tr>
<tr><td>Prevailing Wind Directions & Speeds by Season</td><td>Generally, the coast range has higher average wind speeds throughout the year, which are typically west, with strong east wind events in the winter. The Central Valley typically has lower average wind speeds, with a predominantly west direction. The mountain region has moderate average wind speeds, also typically west, with very strong east (Mono) wind events in the winter. In the table below, winter is considered from October-April and summer from May-September.
<table>
<tr><th></th><th></th><th colspan="2">Average</th><th colspan="2">Max</th></tr>
<tr><th>Region</th><th>Season</th><th>Wind Speed (mph)</th><th>Direction</th><th>Wind Speed (mph)</th><th>Direction</th></tr>
<tr><td rowspan="2">Coast Range</td><td>Winter</td><td>30</td><td>W</td><td>60</td><td>E</td></tr>
<tr><td>Summer</td><td>20</td><td>W</td><td>30</td><td>W</td></tr>
<tr><td rowspan="2">Central Valley</td><td>Winter</td><td>10</td><td>W</td><td>20</td><td>E</td></tr>
<tr><td>Summer</td><td>5</td><td>W</td><td>10</td><td>W</td></tr>
<tr><td rowspan="2">Sierra Nevada Foothills</td><td>Winter</td><td>15</td><td>W</td><td>70</td><td>E</td></tr>
<tr><td>Summer</td><td>15</td><td>W</td><td>20</td><td>W</td></tr>
</table></td></tr>
<tr><td rowspan="3">Miles of Owned Lines Underground and/or Overhead</td><td>Overhead Dist.: 57.8 miles
Overhead Trans.: 162.5 miles
Underground Dist.: 4.0 miles
Underground Trans.: 0 miles</td></tr>
<tr><td>Explanatory Note 1 - Methodology for Measuring “Miles”: [e.g., circuit miles, line miles.] Circuit Miles</td></tr>
<tr><td>Explanatory Note 2 – Description of Unique Ownership Circumstances:

The following distribution lines are where the SFPUC interconnects to PG&E lines from SFPUC facilities. Bay Area region: San Andreas Lake Line, Pilarcitos Line, Sawyer Camp Line, Crystal Springs Line, Pulgas Line. Central Valley region: San Joaquin Valve House and Tesla Portal Line.</td></tr>
<tr><td></td><td>Overhead Distribution Lines as % of Total Distribution System</td></tr>
</table>

Utility Name	San Francisco Public Utilities Commission All line lengths are defined as circuit miles
Percent of Owned Lines in CPUC High Fire Threat Districts (percentages reflect overhead line length).	(Inside and Outside Service Territory)
	Tier 2 Distribution: 75% Tier 3 Distribution: 6% Non-HFTD: 19%
	Overhead Transmission Lines as % of Total Transmission System (Inside and Outside Service Territory)
	Tier 2 Transmission: 26% Tier 3 Transmission: 2% Non-HFTD: 72%
	Explanatory Note 4 – Additional Relevant Context: [e.g., explain any difference from data reported in WMP due to different numerator used for this form]
Customers have ever lost service due to an IOU Public Safety Power Shutoff Event (PSPS)?	Yes Yes, SFPUC-owned, and operated facilities have been impacted. However, PG&E PSPS events do not interrupt the SFPUC's ability to supply power and water services. The SFPUC has backup generators for water treatment plants. The purpose of the SFPUC's power transmission line system is to deliver generation produced by the HHWP Project to the electric grid. The SFPUC transmission lines also feed one of two SFPUC water treatment plants. In the event the SFPUC had to de-energize the transmission lines that feed this water treatment plant, the portion of the transmission system outside of the HFTD would still be back-fed from the electrical grid (PG&E).
Customers have ever been notified of a potential loss of service due to a forecasted IOU PSPS event?	Yes The SFPUC interconnects to PG&E lines as described above in the unique ownership circumstances section. The SFPUC is notified by PG&E before a PSPS event. The SFPUC has been assigned a PG&E representative. Both the SFPUC and PG&E have shared area contact representatives.
Has developed protocols to pre-emptively de-energize electricity in response to elevated wildfire risks?	Yes See Section 5.11
Has previously preemptively shut off electricity in response to elevated wildfire risk?	Yes, refer to Section 5.11 for de-energization protocols. If yes, then provide the following data for the calendar year 2022: Number of shut-off events: 0 Customer Accounts that lost service for >10 minutes: 0 For prior response, average duration before service restored: N/A

1.1.1 Statutory Cross-Reference Table

Our Plan complies with the PUC § 8387 statutory requirements listed in Table 2. Table 2 also provides a reference to where the requirement is described in the Plan (Plan Section).

Table 2 – PUC § 8387 Statutory Requirements Checklist

PUC 8387 Code	Compliance Requirements and Corresponding Plan Sections	Plan Section
(a)	Each local publicly owned electric utility and electrical cooperative shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of wildfire posed by those electrical lines and equipment.	All
(b)(1)	The local publicly owned electric utility or electrical cooperative shall, before January 1, 2020, and annually thereafter, prepare a wildfire mitigation plan. After January 1, 2020, a local publicly owned electric utility or electrical cooperative shall prepare a wildfire mitigation plan annually and shall submit the plan to the California Wildfire Safety Advisory Board on or before July 1 of that calendar year. Each local publicly owned electric utility and electrical cooperative shall update its plan annually and submit the update to the California Wildfire Safety Advisory Board by July 1 of each year. At least once every three years, the submission shall be a comprehensive revision of the plan.	1.2 & 1.4
(b)(2)	The wildfire mitigation plan shall consider as necessary, at minimum, all of the following:	
(b)(2)(A)	An accounting of the responsibilities of persons responsible for executing the plan.	3
(b)(2)(B)	The objectives of the wildfire mitigation plan.	2
(b)(2)(C)	A description of the preventative strategies and programs to be adopted by the local publicly owned electric utility or electrical cooperative to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks.	5

PUC 8387 Code	Compliance Requirements and Corresponding Plan Sections	Plan Section
(b)(2)(D)	A description of the metrics the local publicly owned electric utility or electrical cooperative plans to use to evaluate the wildfire mitigation plan's performance and the assumptions that underlie the use of those metrics.	7.3
(b)(2)(E)	A discussion of how the application of previously identified metrics to previous wildfire mitigation plan performances has informed the wildfire mitigation plan.	7
(b)(2)(F)	Protocols for disabling reclosers and deenergizing portions of the electrical distribution system that consider the associated impacts on public safety, as well as protocols related to mitigating the public safety impacts of those protocols, including impacts on critical first responders and on health and communication infrastructure.	5.9 & 5.11
(b)(2)(G)	Appropriate and feasible procedures for notifying a customer who may be impacted by the de-energizing of electrical lines. The procedures shall direct notification to all public safety offices, critical first responders, health care facilities, and operators of telecommunications infrastructure with premises within the footprint of potential de-energization for a given event.	5.11.2
(b)(2)(H)	Plans for vegetation management.	5.4
(b)(2)(I)	Plans for inspections of the local publicly owned electric utility's or electrical cooperative's electrical infrastructure.	5.5
(b)(2)(J)	A list that identifies describes, and prioritizes all wildfire risks, and drivers for those risks, throughout the local publicly owned electric utility's or electrical cooperative's service territory. The list shall include, but not be limited, to both of the following:	4
(b) (2)(J)(i)	Risks and risk drivers associated with design, construction, operation, and maintenance of the local publicly owned electric utility's or electrical cooperative's equipment and facilities.	4.3
(b)(2)(J)(ii)	Particular risks and risk drivers associated with topographic and climatological risk factors throughout the different parts of the local publicly owned electric utility's or electrical cooperative's service territory.	4.2

PUC 8387 Code	Compliance Requirements and Corresponding Plan Sections	Plan Section
(b)(2)(K)	Identification of any geographic area in the local publicly owned electric utility's or electrical cooperative's service territory that is a higher wildfire threat than is identified in a commission fire threat map, and identification of where the commission should expand a high-fire threat district based on new information or changes to the environment.	4.4
(b)(2)(L)	A methodology for identifying and presenting enterprise-wide safety risk and wildfire-related risk.	4.1
(b)(2)(M)	A statement of how the local publicly owned electric utility or electrical cooperative will restore service after a wildfire.	5.11.3
(b)(2)(N)	A description of the processes and procedures the local publicly owned electric utility or electrical cooperative shall use to do all of the following:	
(b)(2)(N)(i)	Monitor and audit the implementation of the wildfire mitigation plan.	7.5
(b)(2)(N)(ii)	Identify any deficiencies in the wildfire mitigation plan or its implementation and correct those deficiencies.	7.6
(b)(2)(N)(iii)	Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, that are carried out under the plan, other applicable statutes, or commission rules.	7.7
(3)	The local publicly owned electric utility or electrical cooperative shall, on or before January 1, 2020, and not less than annually thereafter, present its wildfire mitigation plan in an appropriately noticed public meeting. The local publicly owned electric utility or electrical cooperative shall accept comments on its wildfire mitigation plan from the public, other local and state agencies, and interested parties, and shall verify that the wildfire mitigation plan complies will all applicable rules, regulations, and standards, as appropriate.	1.2

PUC 8387 Code	Compliance Requirements and Corresponding Plan Sections	Plan Section
(3)(c)	(c) The local publicly owned electric utility or electrical cooperative shall contract with a qualified independent evaluator with experience in assessing the safe operation of electrical infrastructure to review and assess the comprehensiveness of its wildfire mitigation plan. The independent evaluator shall issue a report that shall be made available on the internet website of the local publicly owned electric utility or electrical cooperative and shall present the report at a public meeting of the local publicly owned electric utility's or electrical cooperative's governing board.	8

1.2 Process for Utility Adoption and Submittal of Annual WMP and Opportunities for Public Comment

This Plan, at minimum, meets the requirements of PUC § 8387 for POUs. The public can comment on the WMP during a scheduled SFPUC Commission meeting, in which the Commission will review the WMP. The SFPUC Commission Secretary publishes all upcoming Commission agendas to the sfpuc.org website a week before the Commission meeting date. Additionally, each agenda item has time set aside for public comment. The SFPUC Commission and staff will consider all public comments for inclusion in the final version of the Plan. The meeting agenda includes a link to watch the meetings live and a public comment call-in number to ensure the public has an opportunity to comment on agenda items. The final approved WMP will be submitted to the WSAB and posted to the SFPUC website, which also includes prior years' WMPs and the independent evaluator (IE) report(s). The SFPUC had our initial WMP reviewed by an IE in 2020 and posted the IE Report on the SFPUC website. The SFPUC will have an IE review the 2023 Plan and the IE report will be posted to the SFPUC external-facing website accessible to the public.

1.3 Wildfire Mitigation Funding

HHWP's Operating Budget for Fiscal Years (FY) 2022-23 & 2023-24 includes funding for wildfire mitigation initiatives and activities including vegetation

management and tree-removal contracts, LiDAR flights to help gather and analyze data for potential threats to select overhead transmission and distribution system areas, and funding for software and wildfire-related equipment.

Concurrent with the Operating Budget, is the FY 2022-23 & 2023-24 Capital Budget and Ten-Year Capital Plan. HHWP's Capital Budget for FY 2022-23 & 2023-24 and Ten-Year Capital Plan includes investments in infrastructure projects intended to reduce the risk of wildfire as summarized below:

HHW-Renewal & Replacement (R&R) Wildfire Mitigation (Power) - This project funds wildfire mitigation vegetation management projects, including fuel breaks and Integrated Vegetation Management (IVM) projects to protect assets classified as "Power" only. The project does not fund annual vegetation management plans. Total Approved Budget: $11,916,227.

HHW- R&R Power Distribution Line High-Risk Fire Reduction – This project funds inspections, condition assessments, studies, designs, renewal and replacement, and construction of new microgeneration assets. Total Approved Budget: $4,976,976.

The full "FY 2022-2023 & FY 2023-2024 Adopted Budget" report is available on the SFPUC website[5].

1.4 Description of Where WMP Information Can be Found on the SFPUC Website

The approved SFPUC WMP and IE reports are posted on the SFPUC public-facing website[6]. At this site, the public can also view the previous year's SFPUC WMPs and IE report(s).

1.5 Purpose of the Wildfire Mitigation Plan

This Plan provides a comprehensive overview of the SFPUC programs and

[5] https://sfpuc.org/about-us/reports/operating-and-capital-budgets
[6] https://www.sfpuc.org/about-us/policies-plans/wildfire-mitigation-plan

initiatives to minimize the risk that SFPUC electrical assets are the origin or contributing source of a catastrophic wildfire. Additionally, it is the goal of the SFPUC to maintain compliance with our statutory obligation as specified in California PUC § 8387(a) which requires each local publicly owned electric utility and electrical cooperative to:

> "Construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of wildfire posed by those electrical lines and equipment. After January 1, 2020, each POU shall prepare a wildfire mitigation plan annually and shall submit the plan to the California Wildfire Safety Advisory Board (WSAB) on or before July 1 of that calendar year. Each POU shall update its plan annually and submit the update to the WSAB by July 1 of each year. At least once every three years, the submission shall be a comprehensive revision of the plan".

The SFPUC's primary objectives outlined in this WMP are to support our plan to construct, maintain, and operate our electrical facilities in a manner that minimizes the risk that SFPUC-owned and operated equipment is the origin or contributing source for a catastrophic wildfire; and to provide for a more resilient and reliable grid. The SFPUC has complied with the statutory obligation regarding the annual submission of our WMP as required by PUC § 8387(b)(1) and now submits our 2023 WMP to the WSAB. This 2023 comprehensive Plan revision includes a narrative on how the Plan has matured over the past three years (2020-2022), Plan updates, and Plan revisions to the SFPUC initiatives and programs, a brief forecast of how the SFPUC plans to mature our wildfire mitigation programs for this next 2023-2025 Plan updates, and an IE assessment and report on the Plan. This Plan is subject to public review and comments before final Plan approval by the SFPUC Commission.

1.6 Organization of the Wildfire Mitigation Plan

This Plan includes the following elements:

Section 1 – Executive Summary / Introduction

Section 2 – Objectives of the Wildfire Mitigation Plan

Section 3 – Roles and responsibilities

Section 4 – Wildfire Risk and Risk Drivers

Section 5 – Wildfire Preventative Strategies

Section 6 – Stakeholder Outreach and Engagement

Section 7 – Evaluating the Performance of the Plan

Section 8 – Independent Evaluator

1.7 Summary of Wildfire Mitigation Activities from 2020–2022

1.7.1 Risk Assessment

In 2022, our most significant advancement in understanding and evaluating wildfire risk within our areas of operation was to procure Technosylva's Wildfire Analyst™[7] (Wildfire Analyst™) application. Technosylva is a leading provider of "advanced Geographic Information System (GIS) - enabled software solutions for wildfire protection planning and operational response, as well as firefighter and public safety". Technosylva is used by CAL FIRE, the CPUC, and most of California's investor-owned utilities (IOU). The Wildfire Analyst™ performs a risk analysis on each SFPUC asset and generates a daily Fire Potential Index (FPI) rating for that asset. Additionally, it generates four different consequence risk metrics if an ignition were to occur at a specific asset. The four consequence risk metrics are (1) Fire Size Potential, (2) Population Impacted, (3) Buildings Threatened, and (4) Estimated Number of Buildings Destroyed. Hetch Hetchy Water (HHW) will be working to integrate this tool as a pilot project in the third quarter of 2023 to support the field operation's daily work schedules and inform personnel of areas of risk and if any operating restrictions should be implemented. Once the tool is operationalized within HHW, staff will work to implement this for the NRLM and WSTD of the SFPUC Water Enterprise.

[7] https://technosylva.com/products/wildfire-analyst/

The Wildfire Analyst™ application is explained in detail in Section 5.1.1.

1.7.2 Situational Awareness

From 2020-2022, we continued to improve our situational awareness capabilities. We installed one SFPUC-owned weather station to monitor wind, air temperature, and relative humidity near a distribution line segment in the Tier 2 HFTD. We also collaborated closely with PG&E to gain access to their weather stations that are situated near SFPUC assets. These weather stations combined provide us the ability to monitor weather conditions near our assets throughout the entire area where SFPUC-owned and operated assets are located.

Using Wildfire Analyst™, we now have access to an integrated view of weather stations and High-Definition cameras. Many of these cameras point in the direction of our assets and will help in quickly identifying hazardous conditions that could impact our operations. Additionally, we now have access to real-time active fire incident information for fires that could threaten our assets. The application will also overlay alerts from the National Weather Service, such as Extreme Fire Danger, Extreme Wind Warnings, Red Flag Warnings, and Excessive Heat Warnings on the base map.

1.7.3 Vegetation Management

In 2022, the Vegetation Management Right of Way (VM ROW) Department implemented a data collection system for tracking vegetation trends. This includes the use of a dashboard to track vegetation inspection progress as well as the tree type and trim required (Figure 12). Using the internal E-Logger system, HHW has begun tracking trends in power disruptions caused by vegetation. This allows the division to make better decisions regarding vegetation management based on historical outage information. LiveEO will also be providing us with a satellite analysis of our electrical lines concerning vegetation. More detail on the LiveEO product is provided in Section 5.4.8. The ROW Department is planning on using that data to assure compliance, identify areas of potential tree work, and inform future

trim needs.

1.7.4 Construction, Operations, and Maintenance

In 2020-2022, HHW initiated the following capital improvement projects related to wildfire mitigation:

Moccasin Fire Mitigation Project - This project rehabilitated the Priest Reservoir area after the 2020 Moccasin Fire, which consumed over 2,500 acres including approximately 50 acres within the Priest Reservoir basin. The project removed hazard trees, constructed silt fencing, installed waddles, placed straw, and spread hydro-seed/mulch. The project also rehabilitated access roads servicing the reservoir to improve drainage and reduce cross-slope erosion. The project was completed in October 2020.

A project to upgrade the Fire Suppression System in two HHW powerhouses located in the HFTD is currently in the planning stage. In the 2023-2025 Plan updates, we will provide progress reports on the status of this project.

1.7.5 Wildfire Mitigation and Recovery Analyst Position

In 2020, HHW established the Wildfire Mitigation & Recovery Analyst (WMRA) position to oversee the overall development and maintenance of the SFPUC WMP. The WMRA is the lead of an internal SFPUC team that has responsibility for reviewing the ongoing status of our wildfire mitigation programs and monitoring the effectiveness of the Plan. This team meets monthly, or as required. The WMRA is also the primary SFPUC liaison with the California Municipal Utilities Association (CMUA) for all wildfire mitigation discussions.

1.7.6 Planned Initiatives for the 2023–2025 WMPs

The 2023-2025 SFPUC WMP programs and initiatives are built upon leveraging the successes and lessons learned during the 2020-2022 Plan updates. Our primary goal continues to be to construct, operate, and maintain a safe and resilient

electrical grid and continue to minimize the risk that our assets are not the origin or contributing source for a catastrophic wildfire.

Our primary initiatives during the 2023-2025 Plans are to:

1. Maintain compliance with PUC § 8387 and continue to mature our wildfire mitigation initiatives.
2. Complete the implementation and operationalize the Wildfire Analyst™ risk modeling software.
3. Leverage the Wildfire Analyst™ risk analysis tools to develop a more comprehensive risk-informed wildfire mitigation program.
4. Continue to track metrics to inform the SFPUC on how the WMP programs and initiatives are performing.
5. Evaluate and assign priorities to system hardening options and create implementation time frames.

2. OBJECTIVES OF THE WILDFIRE MITIGATION PLAN

This Plan details the initiatives and programs the SFPUC is undertaking or evaluating to reduce the risk of SFPUC assets being the origin or contributing source for catastrophic wildfires. This comprehensive Plan revision continues to build upon the 2020-2022 WMP programs and initiatives focusing on three primary objectives as listed below. Additionally, it is the goal of the SFPUC to maintain compliance with our statutory obligation as specified in PUC § 8387(a).

2.1 Minimizing Sources of Ignition

The first objective is to continue to evaluate prudent and cost-effective improvements to our physical assets, operations, and training to minimize the risk of SFPUC assets being the origin or contributing source for a catastrophic wildfire. Programs being evaluated or currently implemented include, but are not limited to, evaluating strategic system hardenings, such as increased situational awareness capabilities by adding more strategically placed weather stations and leveraging the existing California network of high-definition mountaintop cameras: evaluating enhanced vegetation management opportunities; and proactive de-energization of lines during critical fire weather conditions. We will continue to evaluate wildfire risk reduction tools, processes, and utility best practices, and implement them over time through Plan evaluation and metric analysis.

2.2 Improve Grid Reliability and Resiliency

The second objective of the SFPUC's wildfire mitigation programs and initiatives is to improve the reliability and resiliency of the SFPUC-owned and operated electric facilities. In addition to reducing wildfire ignition risks, programs such as grid hardening, and enhanced vegetation management provide additional benefits such as improved reliability and resiliency. We will continue to assess industry best practices and new technologies that could help reduce the likelihood of a disruption in service due to planned or unplanned events and expedite grid recovery efforts following a significant event, such as a wildfire.

2.3 Measuring Plan Effectiveness

The third objective of the SFPUC's wildfire mitigation programs and initiatives is to measure the effectiveness and performance of the programs and initiatives as described in this Plan. We will monitor the performance of our Plan, such as a continued decline in equipment failures or vegetation contacts, and make Plan modifications as necessary to improve the safety, reliability, and resiliency of the SFPUC system. This Plan will also help determine if more cost-effective measures could produce the same or better results to reduce the risk of SFPUC electrical assets being the origin or contributing source of a catastrophic wildfire.

3. ROLES AND RESPONSIBILITIES

3.1 POU Organizational Chart and Specific Responsibilities.

This section identifies the SFPUC management staff responsible for the development, approval, and implementation of this Plan and lists, in Figure 3, the operating departments accountable for carrying out the various activities described in the Plan.

During the 2020-2022 Plan updates, HHW assigned a WMRA position to oversee the overall development and maintenance of the Plan. The WMRA is the lead of an internal SFPUC team that has responsibility for reviewing and monitoring the progress of the SFPUC wildfire mitigation programs and monitoring the effectiveness of the Plan. This team meets monthly, or as required. The WMRA is also the primary SFPUC liaison with the CMUA for all wildfire mitigation discussions.

- The SFPUC Commission has the responsibility for approving this Plan.
- The SFPUC Assistant General Manager (AGM) of the Water Enterprise has overall accountability for developing and implementing the Plan.

Figure 3 – SFPUC Organizational Chart

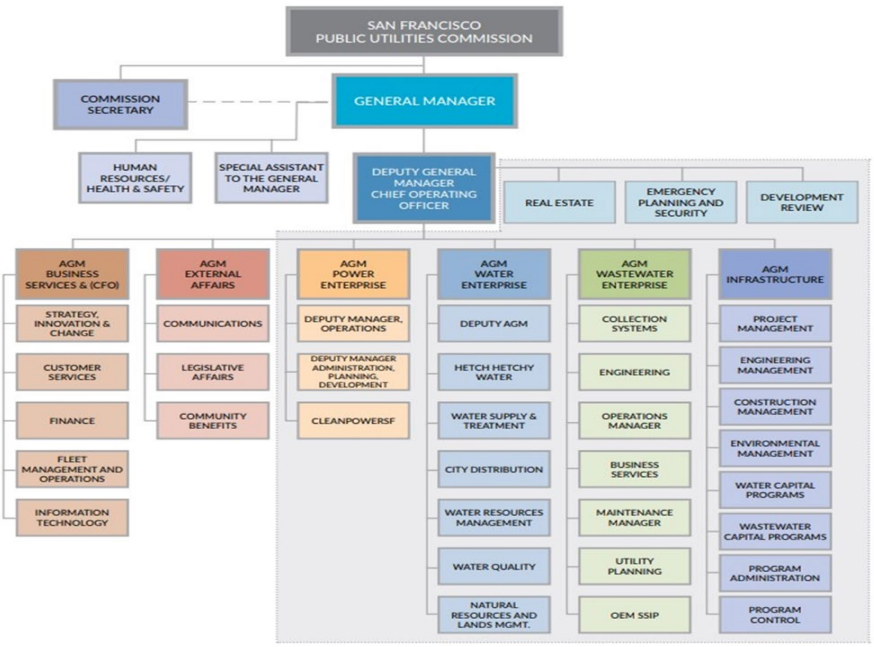


Table 3 – Plan Activities Roles and Responsibilities

Activity	HHW Division: All SFPUC Transmission Facilities; and Distribution Facilities Located within Tuolumne, Stanislaus, Mariposa, and San Joaquin Counties	WSTD and NRLM Divisions: Distribution Facilities Located in Alameda and San Mateo Counties
Transmission Line Vegetation Clearance Inspections	HHW Right of Way Manager; and Vegetation Manager	N/A
Distribution Line Vegetation Clearance Inspections	HHW Right of Way Manager; and Vegetation Manager	NRLM and Peninsula Area Manager
Vegetation Management and Removal	HHW Operations and Maintenance Manager	NRLM Manager
Transmission Asset Inspections Transmission Line Maintenance	HHW Power Generation & Transmission Manager	N/A
Distribution Asset Inspections	HHW Power Generation & Transmission Manager	HHW Power Generation & Transmission Manager
Distribution Line Operations and Maintenance Inspections	HHW Power Generation & Transmission Manager	WSTD Maintenance Section Manager and HHW Power Generation & Transmission Manager
Substation Inspections Recloser Policy and De-energization	HHW Operations and Maintenance Manager	HHW Operations and Maintenance Manager
Plan Coordination and Updates	WMRA	
Plan Review	HHW Division Manager; CCSF City Attorney's Office; and SFPUC Assistant General Manager of Water	NRLM Division Manager, WSTD Division Manager, CCSF City Attorney's Office; and SFPUC Assistant General Manager of Water
Plan Approval	SFPUC Commission	SFPUC Commission

SFPUC utility staff have the following responsibilities regarding fire prevention, response, and investigation:

- Conduct work in a manner that will minimize the risk of ignition for a utility-caused wildfire.
- Take all reasonable and practicable actions to prevent and suppress fires resulting from SFPUC electric facilities.
- Coordinate with federal, state, and local fire management personnel to ensure that appropriate preventative measures are in place.
- Immediately report fires, pursuant to specified procedures.
- Take corrective action when observing or having been notified that fire protection measures have not been properly installed or maintained.
- Ensure compliance with relevant federal, state, and industry-standard

requirements.

- Ensure that relevant incident data is appropriately and timely collected when a utility asset was the cause or contributing source for the ignition of the wildfire.
- Ensure that evidence is appropriately preserved when a utility asset was the cause or contributing source for the ignition of the wildfire.
- Maintain adequate wildfire mitigation training programs for all relevant employees and, if applicable, SFPUC contractors.

3.2 Coordination with Critical Infrastructure Providers

The US Cybersecurity & Infrastructure Security Agency states that "There are 16 critical infrastructure sectors whose assets, systems, and networks, whether physical or virtual, are considered so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof"[8]

The SFPUC considers all CIP sectors of critical importance to the safety and health of our SFPUC employees, and communities that could be impacted by an event impacting SFPUC assets. Coordination activities between SFPUC and the following sectors are described in the sections:

- Water and Wastewater Systems sector.
- Communications sector.
- Healthcare and Public Health sector.

3.3 Coordination with Water Utilities/Department

The SFPUC does not provide electric service to any non-SFPUC-owned and operated water department customers, nor does it impact any non-SFPUC-owned and operated water facilities. All SFPUC-owned and operated water facilities have redundant power supplies to maintain operations during a planned or unplanned power outage. Internal SFPUC communications during emergencies are described

[8] https://www.cisa.gov/critical-infrastructure-sectors

in the SFPUC Emergency Operations Plan.

3.4 Coordination with Communication Infrastructure Providers

The SFPUC supplies power to two cellular towers owned and operated by an independent wireless provider. During planned or unplanned interruptions of the SFPUC lines that could impact these cellular sites, the SFPUC will communicate with the wireless provider on the expected timing and duration of the outage. Both sites have backup generators to avoid disruption to services during planned and unplanned outages.

3.5 Coordination with Healthcare and Public Health sector / Hospitals

Not applicable. The SFPUC does not provide service to any public health facilities.

3.6 Standardized Emergency Management System

The SFPUC has staff that are trained to fulfill certain roles under the Incident Command System (ICS) and can be integrated into an ICS structure. The SFPUC is Standardized Emergency Management System (SEMS) and National Incident Management System (NIMS) compliant and, utilizes the ICS structure to respond to local and regional emergencies.

Currently, the SFPUC does not initiate our ICS structure during Red Flag Warnings. When critical fire weather is forecasted, the powerhouse control center will dispatch Qualified Electrical Workers to patrol power lines and standby for potential de-energization. The control center stays in constant communication with SFPUC management regarding changing weather conditions to monitor for and execute a de-energization event if those triggers are met.

3.7 Mutual Assistance Agreements

During wildfire events, the SFPUC assigns a Liaison Officer to coordinate with emergency response agencies and local government agencies. If the wildfire is near SFPUC assets, an Incident Command Post or Emergency Operations Center is

opened, and an ICS organization is used to manage the operational periods of the event.

The SFPUC is a member of the California Utility Emergency Association (CUEA), which plays a key role in ensuring communications between utilities during emergencies. The SFPUC also participates in the Western Energy Institute's Western Region Mutual Assistance Agreement, which is a mutual assistance agreement covering utilities across several Western states.

4. WILDFIRE RISKS AND RISK DRIVERS

The Office of Energy Infrastructure Safety (OEIS) defines risk as “a measure of the anticipated adverse effects from a hazard considering the consequences and frequency of the hazard occurring.”

4.1 Enterprise-Wide Safety Risks

In the 2020-2022 WMPs, the SFPUC’s risk evaluation approach leveraged the institutional knowledge of our personnel familiar with the historical events that previously impacted our operations. Our risk reduction approach was designed to meet the requirements of industry-recognized standards (i.e., CPUC GOs, NERC Operating Standards, NESC Codes), and best practices utilized by other utilities with more mature wildfire mitigation programs.

For the 2023-2025 annual WMPs, we plan to develop and formalize our risk evaluation approach to minimize the risk that our assets could be the origin or contributing source for a catastrophic wildfire.

In Q4 of 2022, the SFPUC procured the Wildfire Analyst™ application to support our operations and planning groups as described in Section 5.1.1. The Wildfire Analyst™ will be the foundational tool for identifying risks and predicting potential consequences and will support prioritizing risk reduction measures. The goal is to have this application fully functional and operational by Q4 of 2023.

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

We own electrical assets in higher elevations of the Sierra Nevada Mountain range, through the San Joaquin Valley, and into the lower elevation San Francisco Peninsula region.

Our primary topographic and climatological risk drivers identified for wildfire risk are:

- Extended drought,
- Lack of early fall rains,
- Hot temperatures,
- High winds,
- Steep terrain, and
- Vegetation type and density.

4.3 Risks and Risk Drivers Associated with Design, Construction, Operations and Maintenance

The SFPUC does not experience a high volume of risk events that could be the source of ignition for a catastrophic wildfire. HHW tracks planned and unplanned overhead transmission outages through E-Logger. In early 2023, HHW started using E-Logger to track planned and unplanned outages on the HHW distribution lines. We intend to develop a method of tracking planned and unplanned outages for the WSTD distribution lines in late 2023 or early 2024. We will then use this information to track causes and identify trends throughout the SFPUC system.

The SFPUC has identified vegetation contact as our number one risk. In 2020 and 2021 the SFPUC experienced two separate incidents where a tree fell and contacted SFPUC distribution facilities that resulted in an ignition for a wildfire. The SFPUC conducted a root cause analysis and identified additional risks which resulted in removing other trees (additional detail provided in Section 7.3).

Our maintenance programs contribute to minimizing the risk of equipment failure. Other programs to improve system reliability and reduce wildfire risk include replacing CAL FIRE non-exempt equipment with CAL FIRE-approved exempt equipment, transformer replacement program, and brush clearing to comply with Public Resources Code (PRC) § 4292. These programs and other initiatives are further described in Section 5.

4.4 High Fire Threat District

The SFPUC participated in the development of the CPUC's Fire-Threat Map[9] which designates a High-Fire Threat District (HFTD) (Figure 4). The CPUC describes the HFTD as follows:

1. Tier 1 High Hazard Zones (HHZs) on the U.S. Forest Service-CAL FIRE joint map of Tree Mortality HHZs ("Tree Mortality HHZ Map").
   a. The Tree Mortality HHZ Map is an off-the-shelf map. Tier 1 HHZs are zones near communities, roads, and utility lines, and are a direct threat to public safety.
2. Tier 2 and Tier 3 fire-threat areas on the CPUC Fire-Threat Map.
   a. Tier 2 fire-threat areas outline areas where there is an elevated risk (including likelihood and potential impacts on people and property) from utility-related wildfires.
   b. Tier 3 fire-threat areas outline areas where there is an extreme risk (including likelihood and potential impacts on people and property) from utility-related wildfires.

In the map development process, the SFPUC reviewed the proposed boundaries of the fire-threat areas and confirmed that, based on local conditions and historical fire data. All our assets are located within the proper fire-threat area (Figure 5).

[9] https://www.cpuc.ca.gov/industries-and-topics/wildfires/fire-threat-maps-and-fire-safety-rulemaking

Figure 4 – CPUC High Fire-Threat District Map

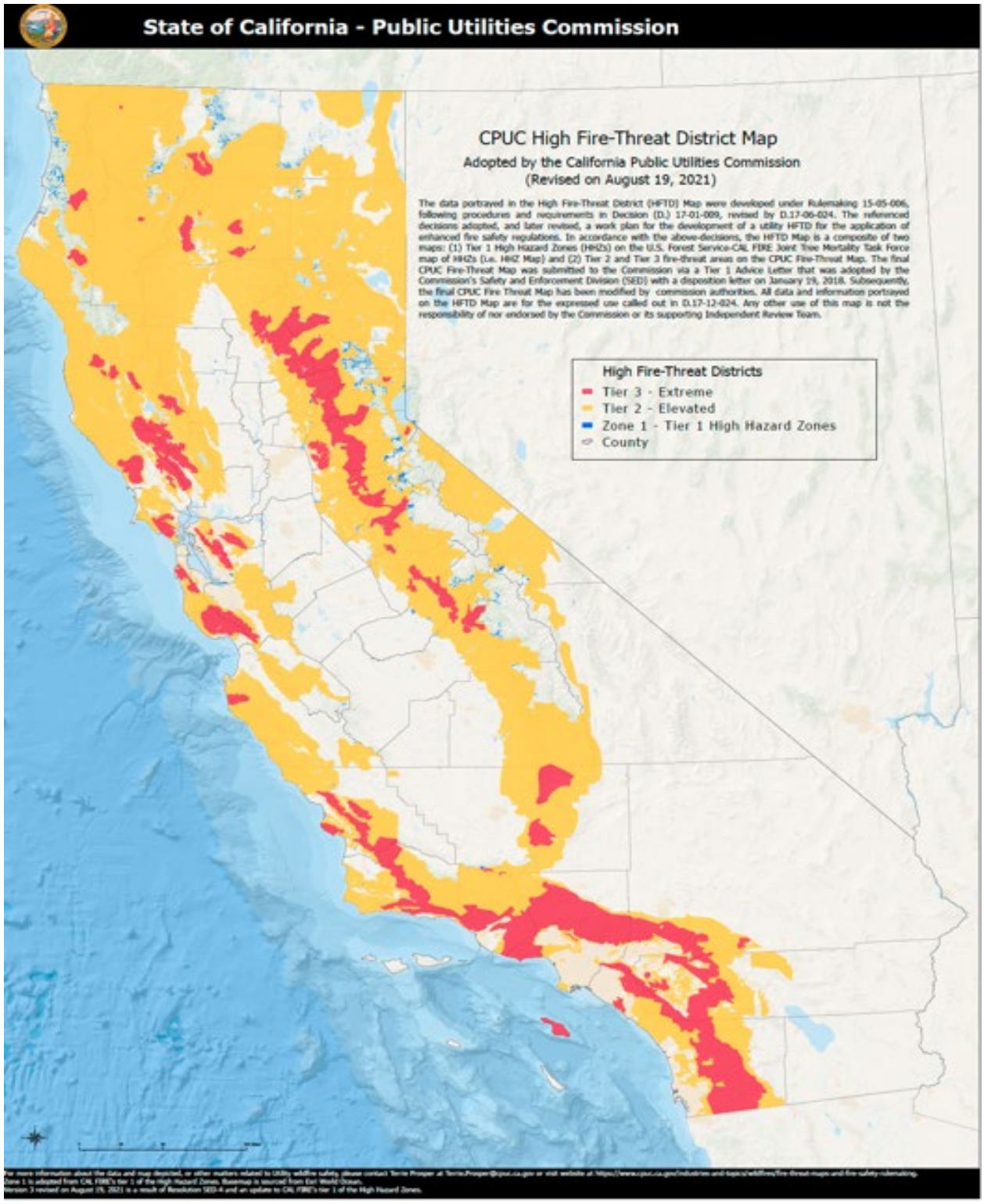
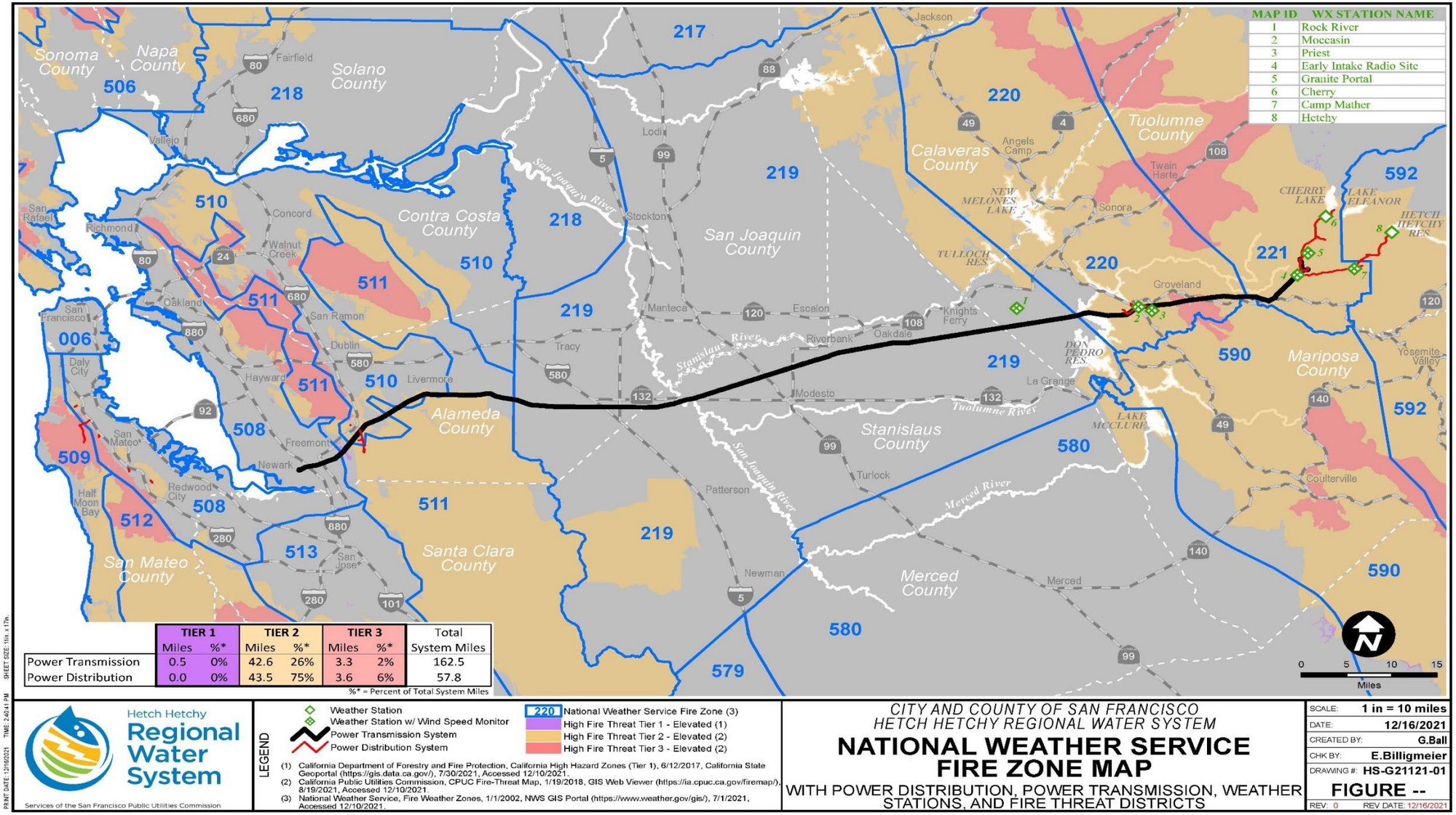


Figure 5 – SFPUC Electrical Assets and HFTDs



	TIER 1		TIER 2		TIER 3		Total
	Miles	%*	Miles	%*	Miles	%*	System Miles
Power Transmission	0.5	0%	42.6	26%	3.3	2%	162.5
Power Distribution	0.0	0%	43.5	75%	3.6	6%	57.8

%* = Percent of Total System Miles

Hetch Hetchy Regional Water System
Services of the San Francisco Public Utilities Commission

LEGEND

- Weather Station
- Weather Station w/ Wind Speed Monitor
- Power Transmission System
- Power Distribution System
- 220 National Weather Service Fire Zone (3)
- High Fire Threat Tier 1 - Elevated (1)
- High Fire Threat Tier 2 - Elevated (2)
- High Fire Threat Tier 3 - Elevated (2)

(1) California Department of Forestry and Fire Protection, California High Hazard Zones (Tier 1), 6/12/2017, California State Geoportal (https://gis.data.ca.gov/), 7/30/2021, Accessed 12/10/2021.
(2) California Public Utilities Commission, CPUC Fire-Threat Map, 1/19/2018, GIS Web Viewer (https://ia.cpuc.ca.gov/firemap/), 8/19/2021, Accessed 12/10/2021.
(3) National Weather Service, Fire Weather Zones, 1/1/2002, NWS GIS Portal (https://www.weather.gov/gis/), 7/1/2021, Accessed 12/10/2021.

CITY AND COUNTY OF SAN FRANCISCO
HETCH HETCHY REGIONAL WATER SYSTEM

NATIONAL WEATHER SERVICE FIRE ZONE MAP

WITH POWER DISTRIBUTION, POWER TRANSMISSION, WEATHER STATIONS, AND FIRE THREAT DISTRICTS

SCALE:	1 in = 10 miles
DATE:	12/16/2021
CREATED BY:	G.Ball
CHK BY:	E.Billigmeier
DRAWING #:	HS-G21121-01
	FIGURE --
REV: 0	REV DATE: 12/16/2021

PRINT DATE: 12/16/2021 TIME: 2:40:41 PM SHEET SIZE: 11in. x 17in.

4.5 Changes to CPUC Fire Threat Map

The SFPUC has not identified any areas near our electrical assets that are of higher wildfire threat than is identified in the CPUC fire threat map.

For the 2023-2025 Plan updates the SFPUC agrees with the existing CPUC HFTD boundaries and makes no recommendation for expanding or minimizing the current HFTD.

4.6 Climate Change/ Weather Risks

The National Oceanic and Atmospheric Administration[10] (NOAA) describes climate change as, “Any significant change in the measures of climate for extended periods, usually over decades or longer. This includes major, long-term changes in temperature, precipitation, humidity, ocean heat, wind patterns, sea level, sea ice extent, and other factors, and how these changes affect life on Earth.”

NOAA also states that “Global temperatures rose about 1.98°F (1.1°C) from 1901 to 2020, but climate change refers to more than an increase in temperature. It also includes sea level rise, changes in weather patterns like drought and flooding, and much more. Things that we depend upon and value — water, energy, transportation, wildlife, agriculture, ecosystems, and human health — are experiencing the effects of a changing climate.”

The SFPUC Climate Change Collaboration and Coordination Committee (C5) was established in 2018 to develop, coordinate, and communicate a comprehensive and consistent approach to mitigating and adapting to climate change. The SFPUC continues to evaluate climate studies and findings of the C5 to assess potential impacts to areas and our electrical assets in the HFTD.

The C5 membership includes representatives from most departments within the

[10] https://www.noaa.gov/explainers/what-s-difference-between-climate-and-weather

SFPUC. The committee meets bi-monthly[11] to develop a strategy to ensure climate change threats and impacts are considered and addressed in utility operations, capital programs, and long-term planning. C5 has created a climate change policy that establishes the following goals:

1. Reduce greenhouse gas emissions in alignment with City-wide climate change goals.
2. Assess vulnerability and adapt to ensure long-term resilience.
3. Evaluate climate change and its impact on the level of service goals.
4. Respond to the threats and impacts of climate change to address the disproportionate effects on environmental justice and low-income communities.
5. Protect and enhance the resilience and health of watershed ecosystems and lands affected by climate change and SFPUC activities.
6. Include climate adaptation and mitigation in capital planning and project selection criteria.
7. Communicate transparently and proactively with stakeholders on climate change and the SFPUC's adaptation and mitigation strategies.
8. Integrate climate change response across SFPUC divisions and City and County Programs and Policies.
9. Report annually and track the implementation of this policy.

4.7 Extended Drought

The SFPUC's service territory has experienced extended periods of drought over the years. A state of emergency due to severe drought conditions was declared by the Governor of California in 2021. Drought in combination with dryness and other factors can create an ideal situation for the ignition and rapid spread of wildfires. This changed in late 2022 and early 2023 when there was record rain and snow accumulation. In March 2023 California Governor Newsom signed Executive Order N-5-23 which reduced some of the water use restrictions put in place during the

[11] https://sfpuc.org/sites/default/files/about-us/commission/2021-10-29-Climate-Change-Workshop-v01.pdf

original emergency proclamation in 2021. The SFPUC is evaluating the impacts of the increased rainfall and snowpack on vegetation growth and wildfire risk.

5. WILDFIRE PREVENTATIVE STRATEGIES

5.1 Situational Awareness

We made significant advancements in the 2020-2022 Plan updates to enhance our ability to monitor forecasted and real-time weather conditions. This section describes the various programs we continue to develop for situational awareness.

5.1.1 Technosylva Wildfire Analyst™ / Fire Potential Index (FPI)

In 2022, our most significant advancement in understanding and evaluating wildfire risk within our areas of operation was the procurement of Technosylva's Wildfire Analyst™ application. Technosylva is a leading provider of "advanced GIS-enabled software solutions for **wildfire protection planning and operational response, as well as firefighter and public safety."** Technosylva is used by CAL FIRE, the CPUC, and all of California's investor-owned utilities (IOU). The Wildfire Analyst™ performs a risk analysis on each SFPUC asset and produces a Fire Potential Index (FPI) rating for that asset. Additionally, the Wildfire Analyst™ produces four different consequence risk metrics if an ignition were to occur at a specific asset. The four consequence risk metrics are (1) Fire Size Potential, (2) Population Impacted, (3) Buildings Threatened, and (4) Estimated Number of Buildings Destroyed. This tool, in conjunction with existing critical fire weather monitoring tools, will initially be used to support HHW field operations' daily work schedules and inform personnel of areas of risk and if any operating restrictions should be implemented. HHW is currently piloting the Wildfire Analyst™ application and updating its operating procedures to reflect this new way of monitoring fire weather conditions. As HHW gains more experience and best practices using this application it will be implemented by NRLM and WSTD to inform their daily operations.

PG&E supported the SFPUC in the implementation of the Wildfire Analyst™ risk model. PG&E permitted the SFPUC and Technosylva to use the PG&E FPI algorithms to develop the SFPUC risk indexes. All the SFPUC electrical assets are within the PG&E service territory. The benefit of PG&E sharing their FPI data is that

using the same data sources will allow the SFPUC to have an FPI model consistent with the PG&E FPI model which has been tested and validated.

5.1.2 Weather Monitoring

During the 2020-2022 Plan updates, the SFPUC used publicly available weather data including weather forecasts to support real-time operating decisions. HHW obtains wind speed conditions using forecast models from NOAA's High-Resolution Rapid Refresh (HRRR), generating average and peak wind forecasts for the next 24-hour operating period. The automated process generates an hourly email with the forecast and is sent to HHW operations managers. Wind and weather data is reviewed daily and used to support operational strategies for the HHW overhead electrical lines to determine if any operational restrictions or if lines should be de-energization for public safety.

NRLM/WSTD monitors weather through the National Weather Service (NWS), NOAA, and other publicly available weather services. This information is used to determine any operational restrictions for NRLM and WSTD field staff. Weather conditions are distributed to staff through the Millbrae dispatch center via i-INFO[12].

HHW and NRLM/WSTD staff use publicly available weather forecasts and monitor fuel (vegetation) conditions by accessing publicly available information provided by the NWS, USFS's daily Project Activity Level[13] (PAL) rating, Bureau of Land Management, NOAA, and CAL FIRE. SFPUC staff monitor the NWS for Red Flag Warnings.

In 2022 the SFPUC acquired the Wildfire Analyst™ as our primary situational awareness tool and risk modeling application. The Wildfire Analyst™ is in development with an implementation date of Q3 of 2023. In 2023 we will continue to

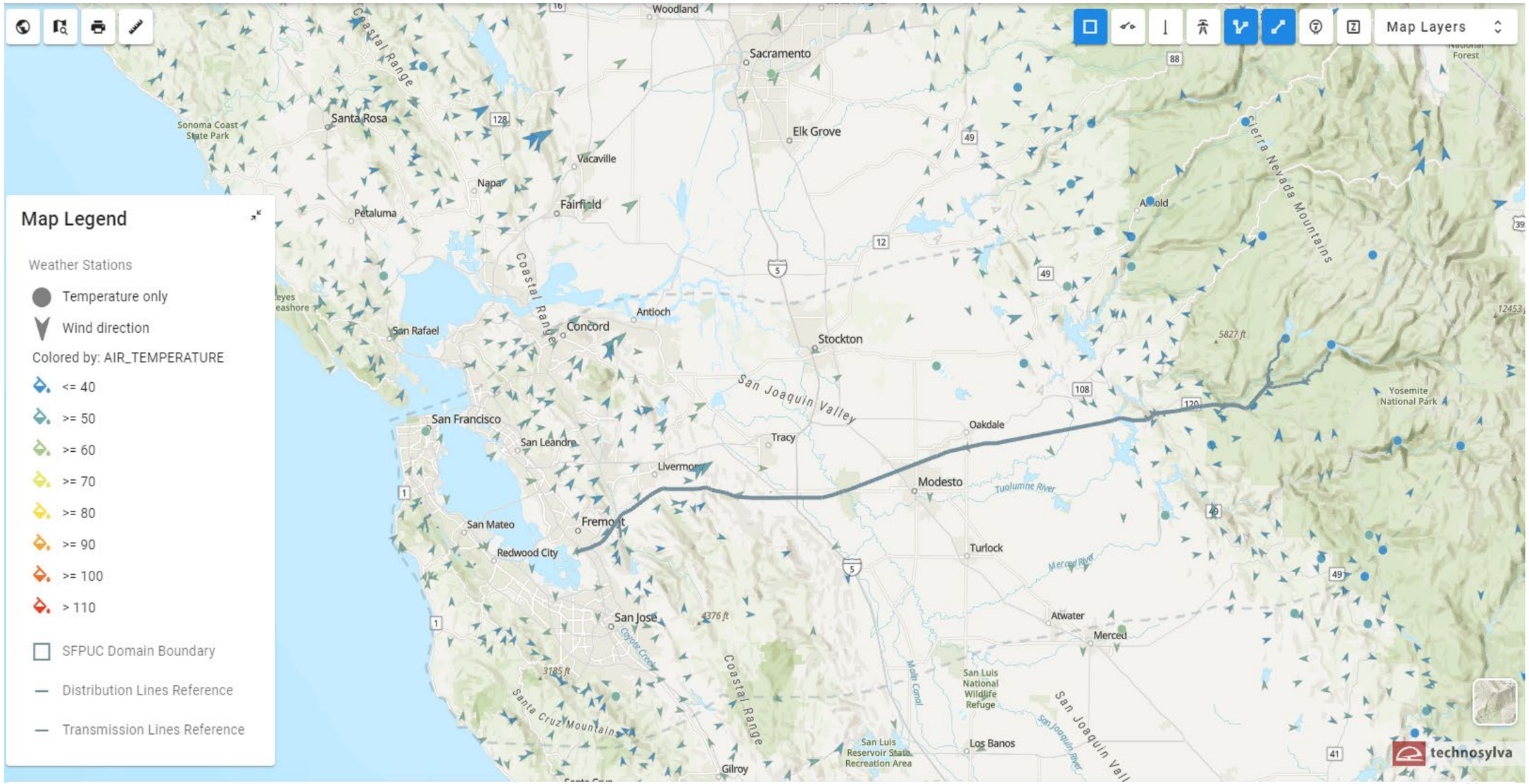
[12] https://dashboard.i-info.com/
[13] Project Activity Level is a decision support tool designed to help fire and timber resource managers establish the level of industrial precaution for the following day. This tool utilizes outputs from the National Fire Danger Rating System (NFDRS).

collect weather information from the current HRRR model until the Wildfire Analyst™ functionality is validated and approved for full implementation.

5.1.3 Weather Stations

During the 2020-2022 Plan updates, HHW upgraded one of our precipitation monitoring stations in the HFTD with a wind sensor, air temperature, and relative humidity sensor for increased situational awareness. With the implementation of the Wildfire Analyst™, the SFPUC will also have access to approximately 325 PG&E or privately owned weather stations providing, at minimum, temperature, relative humidity, and wind speed readings. These weather stations are situated near SFPUC assets and up to a 25-mile buffer from those assets. Figure 6 shows a graphic of the weather station data now available to the SFPUC through the Wildfire Analyst™ application.

Figure 6 – Weather Stations



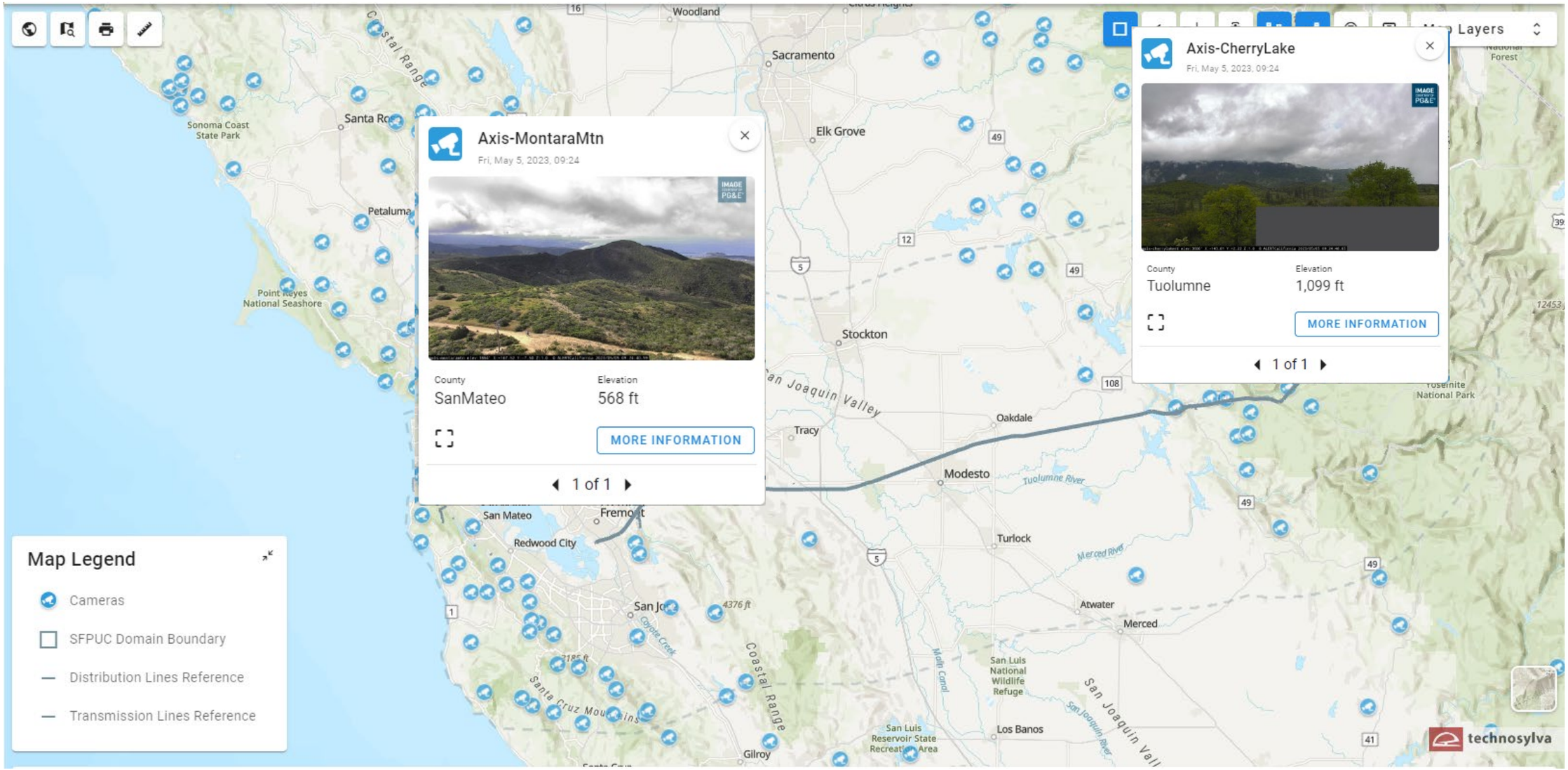
5.1.4 Wildfire Cameras

During the 2020-2022 Plan updates, we partnered with PG&E and a communications provider to install two high-definition cameras on SFPUC towers located within the HFTD. PG&E purchased the cameras, and the communications company provides the communications infrastructure for viewing imagery on the ALERTWildfire website[14]. With the implementation of the Wildfire Analyst™, we have access to approximately 110 cameras providing viewsheds of areas in proximity to SFPUC assets. Figure 7 displays the cameras and live feeds available to the SFPUC in the Wildfire Analyst™ application.

In December 2020, the SFPUC began the process to install additional cameras near SFPUC assets. The locations will include Poopenaut Peak near the O'Shaughnessy Dam site in Yosemite National Park, Burnout Ridge near Cherry Lake, and Intake Ridge near Kirkwood Powerhouse. These areas are in Tier 2 and 3 HFTDs where the SFPUC operates overhead lines. The increased monitoring of the area will enhance our situational awareness, and these cameras will be added to the Wildfire Analyst™ application. The licensing process for these sites is complex due to different land ownership rights and review processes. We continue to coordinate with the various land management agencies for final approval to install the cameras.

[14] https://www.alertwildfire.org/

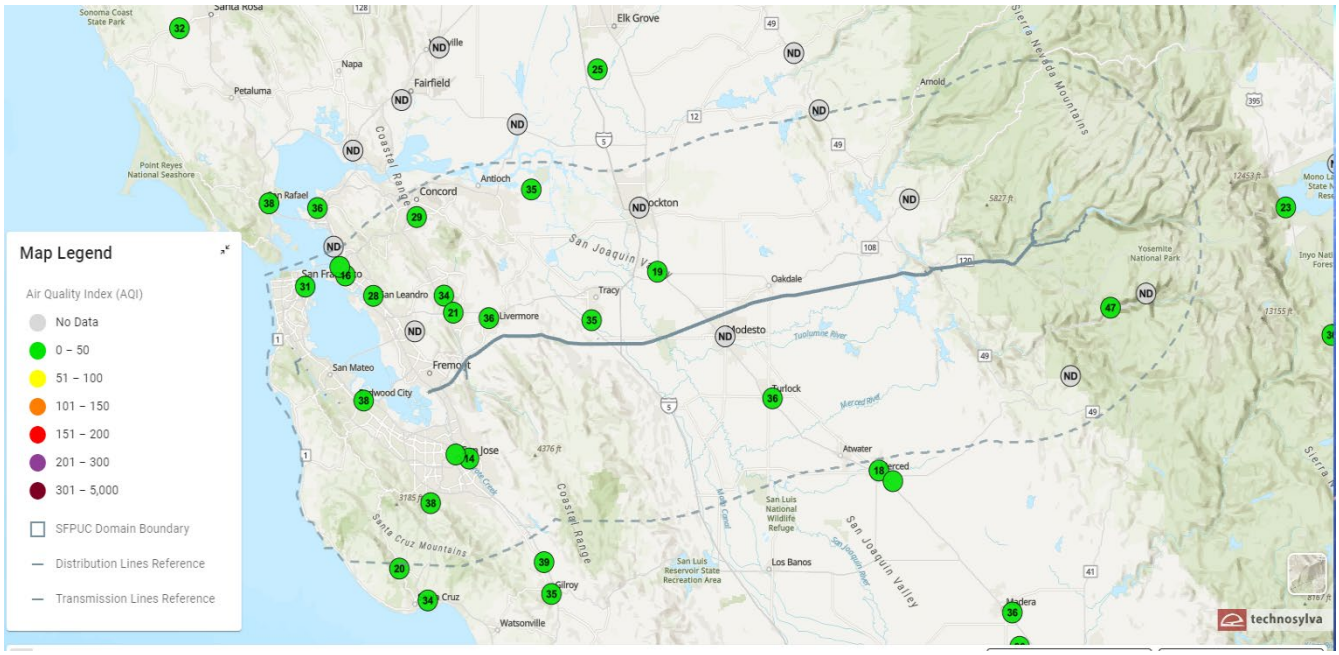
Figure 7 – Wildfire Cameras



5.1.5 Air Quality Monitoring

Air quality is monitored for staff safety, especially when nearby wildfire smoke or other known air quality pollutants are present. We use services such as PurpleAir.com which accesses air quality index monitors in all SFPUC regions. Additionally, the Wildfire Analyst™ product also has an air quality alert module, which can be used to supplement other data sources (Figure 8).

Figure 8 – Air Quality Monitors



5.1.6 Fire Mitigation / Suppression Equipment

The SFPUC FY 2020-2021 & 2021-2022 Adopted Budget included funding to purchase fire mitigation/suppression equipment needing replacement or new equipment where a gap had been identified in the SFPUC fleet. Purchase requisitions were submitted for the following equipment,

1. One (1) Kubota L6060HSTC 4X4 tractor,
2. One (1) DJI Matrice 300 RTK Combo Plus drone,

3. One (1) LiAIR V70 LiDAR mapping system with LiGeoreference software to be attached to the Matrice 300 RTK drone, and
4. One (1) Ford 550 Altec bucket truck.

The equipment was added to our fleet in Q4, 2022.

In Q2 of 2022, we purchased a commercial-grade drone with a 45-megapixel camera capable of 30x optical zoom. The drone was received in Q4 of 2022. This equipment will be for used ground surveys and inspections of SFPUC water and power assets when they are inaccessible by vehicles due to snow accumulation or road damage. We are currently exploring the purchase of a LiDAR and thermal imaging camera which can be applied to wildfire mitigation programs such as vegetation management and electrical asset inspections. As the FY 2023-24 and 2024-25 budgets are developed SFPUC will provide an update in the 2024 Plan regarding future equipment purchases to enhance the drone's wildfire mitigation capabilities.

During the filing of the 2022 SFPUC WMP, the following fire mitigation and suppression equipment approved in the FY 2021-2022 budget was ordered (Figure 9). The SFPUC continues to work with the vendors to secure delivery dates that are delayed due to supply-chain interruptions caused by COVID-19.

- One (1) Peterbilt 584 water truck with a 3600-gallon tank
- One (1) Volvo ECRF58F excavator with Raptor 30G mulcher

Figure 9 – Fire Suppression Equipment

5.2 Design and Construction Standards

The SFPUC meets or exceeds the requirements of GOs 95, 128, 165, 174, NERC Reliability Standard FAC-003-4, and applicable National Electric Safety Codes (NESC) to construct, maintain, and operate a safe, reliable, and resilient grid. The SFPUC has effective legacy programs for construction, inspections, and maintenance of transmission, distribution, generation, and substation assets within the HFTD and taking corrective action within specified timeframes for all issues that require remediation.

For the 2023-2025 Plan updates, the SFPUC plans to leverage the Wildfire Analyst™ risk modeling application to support more risk-informed decisions for the construction and maintenance of our electrical assets. The SFPUC plans to formalize these programs based on data gathered from the use of the Wildfire Analyst™ and will provide a progress report in the 2024 WMP update.

5.2.1 System Hardening

During the 2020 – 2022 Plan updates, the SFPUC initiated assessments and studies for the following system hardening options:

- Increasing the number of standby generators
- Installation of fast-reacting protective relays
- Replacement of Existing Copper Conductor with Aluminum
- Replacement of PRC § 4292 Non-Exempt Equipment
- Removal of Overhead Lines
    - Overhead to Underground Conversion
    - Micro-Hydro

Table 4 lists each of the above-stated options and an analysis of the level of effort, risk reduction, actions the implementation would resolve, and secondary issues that would be mitigated or would need to be addressed before construction begins. The narrative includes additional information on each of these options as well as the next

steps to be accomplished over the 2023 – 2025 Plan updates.

Table 4 – SFPUC Wildfire Mitigation Strategies

Strategy	Public Safety Risk	Actions	Secondary Issues
Status Quo	Reduced	✓ De-Energize 22.9kV circuits during high-risk weather conditions ✓ Activate standby generators at selected Comm Sites & up-country dams	▪ Operating cost to send a line crew to operate the switch and observe for fire watch. ▪ Operating cost of line crew to patrol lines before re-energizing.
Shortest Path to reduce wildfire risk	Additional Reduction	✓ De-Energize 22.9kV circuits during high-risk weather conditions	▪ Same as above
		✓ Increase the number of standby generators at Comm Sites & up-country dams—OSH Compound Standby Generator Project (underway), Poopenaut Pass Comm Site Standby Generator (new). Increase fuel storage for increased generator run-time at all locations.	▪ Increases maintenance costs to auto-test and perform preventative maintenance on larger standby generator fleet. ▪ Increases fuel costs and demand for red diesel and propane.
		✓ Install fast-reacting protective relays to sense and open circuits faster.	▪ Risk reduction is dependent on existing power protection infrastructure and may require electric protection system upgrades not yet scoped.
Moderate Path to reduce wildfire risk	Moderate Reduction	✓ Install PRC 4292-exempt equipment	▪ Eliminates vegetation removal beneath equipment
		✓ Replace conductors with Aluminum	▪ Increased risk of cross-arm and pole breakage
May include actions above		✓ Underground existing 22.9kV overhead conductors.	▪ Multiple pull boxes to be field located ▪ Pole/pad-mounted switches/disconnects are still required ▪ Must maintain vegetation above ROW underground ducts. ▪ Running ducts under road surfaces increases the lengths and # of pull boxes.

Longest Path to reduce wildfire risk	Significant Reduction	✓ Install distributed generation at critical sites, e.g., solar/batteries, industrial battery banks, micro-hydro AND de-energize 22.9kV overhead distribution during lower fire risk periods	▪ Increases maintenance costs on distributed generation assets.
May include actions above		✓ Install distributed generation at critical sites, e.g., solar/batteries, industrial battery banks, micro-hydro (Cherry Valley Dam &/or O'Shaughnessy Dam) AND decommission existing 22.9kV overhead distribution lines	▪ Increases maintenance costs on distributed generation assets. ▪ Decommissioning (removal) of overhead lines. ▪ Reduced Operations & Maintenance costs due to decommissioned lines. ▪ SFPUC facilities at Poopenaut Pass, Burnout Ridge, Intake Radio Site, Cherry/Eleanor Pump Station, Granite Portal Valve house, OSH Compound, and Cherry Camp/Pump will require a new dedicated power supply. ▪ CCSF Camp Mather will require a new dedicated power supply. ▪ 3rd Party sites at NPS Kiosk and Evergreen will require a new dedicated power supply ▪ ROW maintenance is still required for fiber/wire overhead communication cables.

5.2.2 Replace Wood Poles

We are not considering a programmatic replacement of wood poles with ductile or steel poles within the 2023-2025 Plan updates.

5.2.3 Replace Overhead #6AWG Copper Conductor

During the 2020-2022 Plan updates, HHW conducted an audit of copper conductors installed on our distribution lines. We identified 13.6 circuit miles of copper conductors in the HFTD. The topography of these areas varied from a mixture of coniferous forest, oak woodland, and granite with little vegetation.

We have no history of risk events caused by a failure of copper wire. A cost-benefit analysis was conducted to determine if HHW would move forward with a mitigation

project. The cost to undertake a stand-alone project to replace copper wire would be significant due to additional system upgrades which would be required and many areas where work would be performed are in rugged terrain.

Based on this information and analysis, HHW leadership elected to not move forward with a stand-alone copper conductor replacement project; however, the copper conductors will be replaced with aluminum as the equipment requires replacement or upgrades.

5.2.4 Replacement of Non-Exempt Equipment

Approximately 15 percent of SFPUC distribution poles, including those located in non-HFTD areas, support non-exempt equipment defined by PRC § 4292 and CAL FIRE's California Power Line Fire Prevention Field Guide.

We will continue maintaining a firebreak around structures that have non-exempt equipment in both the HFTD and non-HFTD. This firebreak consists of clearing not less than a 10-foot radius from the outer circumference of the pole or tower pending the replacement of non-exempt equipment with exempt equipment.

HHW contracted with a firm to complete a load study on distribution assets to identify at-risk facilities, such as overloaded transformers, undersized fuses, etc. HHW has reviewed the results of the study and has begun looking at procuring replacement equipment, such as PRC § 4292 exempt non-expulsion fuses.

5.2.5 Avian Protection

We do not currently have a formal avian protection program, but we do install bird guards on facilities believed to be at risk of bird contact or another animal contact. During the 2023-2025 Plan updates, we will provide an update on our avian protection program.

5.3 Overhead Line Removal

5.3.1 Overhead to Underground Conversion

In September 2020, the SFPUC commissioned a consultant to perform three studies to assess the construction costs of underground three existing overhead electrical distribution lines located in the HFTD. The final analysis shows that the project is physically infeasible in some locations due to terrain and geology (steep canyons and granite); however, for the areas where undergrounding is shown as physically feasible, the SFPUC will evaluate and determine whether undergrounding these portions has the most cost-benefit versus other system hardening options described in this section of the WMP.

5.3.2 Micro-Hydro (Overhead Line Removal)

During the 2020-2022 Plan updates the SFPUC initiated a study to evaluate the feasibility of placing micro-hydropower generation units at Cherry and O'Shaughnessy Reservoirs to provide power for these remote sites. The overall goal of adding micro-hydro units would be to reduce the SFPUC's overhead distribution line miles within the HFTD.

During the 2023-2025 Plan updates, the matrix shown in Table 4 will be refined to analyze and assign priorities and implementation timeframes to the various system hardening studies and reports that have been generated over the 2020-2022 Plan updates. The SFPUC intends to provide an update in the 2024 WMP that refines this matrix and how the SFPUC is prioritizing system hardening projects.

5.4 Vegetation Management

The SFPUC meets or exceeds the industry standards for vegetation management around transmission lines, distribution lines, and substation facilities, and is in compliance with the SFPUC internal Hetch Hetchy Water and Power Transmission Vegetation Management Program plan (TVMP Revision 5.2). For transmission-level facilities, the SFPUC complies with North American Electric Reliability Corporation

(NERC) FAC-003-4, where applicable. For both transmission and distribution level facilities, the SFPUC meets or exceeds the following standards:

- California PRC § 4291
- California PRC § 4292
- California PRC § 4293
- CPUC GO 95 Rule 35
- CPUC GO 95 Appendix E Guidelines to Rule 35
- CPUC GO 174
- CAL FIRE'S Power Line Fire Prevention Field Guide – 2021

These VM standards require significantly increased clearances in the HFTD. The recommended "time-of-trimming" guidelines in CPUC GO 95 do not establish a mandatory standard for vegetation clearances but provide helpful guidance to utilities. We use specific knowledge of tree growth rates and tree species to determine the appropriate time-of-trimming clearance in each circumstance. These VM standards significantly increase the vegetation clearances required within the HFTD.

Figure 10 – Distribution PRC § 4292 Pole

The SFPUC performs VM with two groups: 1) the HHW group, inspects and maintains vegetation on the HHWP Project from O'Shaughnessy Dam to Newark; and 2) the NRLM group inspects and maintains vegetation in proximity to distribution facilities in and around the Bay Area region.

At HHW a certified arborist with the following certifications, International Society of Arboriculture (ISA) Certified Arborist, ISA Certified Utility Arborist, and ISA Tree Risk Assessment Qualified (TRAQ) completes the inspections. The HHW Right-of-Way (ROW) VM labor crew is made up of one laborer supervisor, one operating engineer, one certified arborist, and five laborers.

The NRLM VM crew is comprised of three arborists and three to five seasonal watershed workers responsible for the Alameda and Peninsula Watershed. Two registered professional foresters support the work (one for the Alameda Watershed and one for the Peninsula Watershed).

5.4.1 Annual Vegetation Management Work Plan

Vegetation Management work across the ROW is planned and scheduled annually. All VM activities are listed and described in the Annual Vegetation Management Work Plan (AVMWP) to ensure VM work is conducted timely. The annual work plan is reviewed quarterly and modified as needed in response to changing conditions or findings from vegetation inspections. The work plan identifies the facilities inspected the previous year, proposed work, and completed work. The SFPUC uses Maximo to generate VM work orders. Maximo (IBM™) is a computerized asset and maintenance management system (CMMS) for managing our programmatic maintenance and repair program. Preventative maintenance work orders for detailed transmission and distribution line inspections and substation inspections are managed through Maximo.

5.4.2 Vegetation Inspections / Transmission Lines

A detailed ground inspection (patrol) of all vegetation near 230kV transmission lines,

both in the HFTD and non-HFTD, is performed annually. Inspection details, including the name of the inspector and date and line section, are documented in ArcGIS Field Maps and noted on the HHW AVMWP. These ground inspections identify all conditions where vegetation may encroach within the Minimum Vegetation Clearance Distance (MVCD) for energized facilities before the next scheduled predictive control treatment. Attention is given to visual assessments of trees within the strike zone of energized facilities to identify tree defects that could cause a tree, or parts of a tree, to fall directly onto overhead high-voltage conductors. Individual trees undergo additional inspections of a detailed 360-degree visual evaluation to determine the presence, significance, and severity of tree defects and risks.

In 2020, the SFPUC updated the HHW 115kV Transmission Vegetation Management Plan (115kV VMP) to mitigate further the potential of SFPUC equipment being the origin or contributing source of ignition for a catastrophic wildfire. The 115kV VMP provides detailed program objectives with clearly assigned roles and responsibilities for HHW staff. In December 2022, the 115kV VMP received final signatures and was given an official internal operations and maintenance policy number.

Like the 230kV, the 115kV TVMP follows the AVMWP. The HHW ROW Manager creates the AVMWP and identifies the facilities managed and any proposed work forecasted, with start and completion dates.

The SFPUC will inspect the 115kV transmission system annually for vegetation clearances. Inspection details, including the name of the inspector and date and line section, are documented in ArcGIS Field Maps and noted on the HHW AVMWP. Additional corrective maintenance observed during the daily course of work by the Line Crew, Vegetation Management Crew, and Watershed Keepers will be submitted to the Asset Management work group for a corrective maintenance work order.

Table 5 illustrates that 25 vegetation corrective maintenance work orders were issued in 2022, and all have been completed. The most common corrective

maintenance identified in 2022 was the trimming or removal of trees near transmission lines and towers. The HHW ROW group has been working to increase communication of permitting requirements for orchard owners near the transmission ROW to reduce grow-in problems and the removal of orchard owner crops.

Table 5 – Vegetation Corrective Maintenance Work Orders for 230kV/115kV

Year	Number of Work Orders	Total Completed
2019	41	41
2020	16	16
2021	22	22
2022	25	25

5.4.3 Vegetation Inspections / Distribution Lines

All vegetation patrols in proximity to distribution lines within the HFTD meet or exceed the requirements of CPUC GO 95. The HHW distribution lines are patrolled and inspected on the ground and aerially annually for vegetation clearances. The HHW arborist performs the ground inspections. The aerial inspections include the line crew (Qualified Electrical Worker – QEW) and the ROW Vegetation Management crew. The inspections serve dual purposes: (1) to allow the line crew to inspect the distribution lines and equipment for any corrective line maintenance required, and (2) to allow the arborist and VM crew to inspect for vegetation that may be encroaching within the MVCD which may require corrective maintenance work.

The NRLM-certified arborist performs annual inspections of vegetation in proximity to WSTD distribution lines in the Alameda and Peninsula Watersheds. The arborist submits any corrective maintenance work order prescriptions for the NRLM tree crews for mitigation.

In 2020, the SFPUC updated the HHW Power Distribution Vegetation Management Plan (Power DVMP) to mitigate further the potential of SFPUC equipment being the

origin or contributing source for the ignition of a catastrophic wildfire. The DVMP provides detailed program objectives with clearly assigned roles and responsibilities for HHW staff. In December 2022, the DVMP received final signatures and was given an official internal operations and maintenance policy number.

The Power DVMP further establishes the protocols for the AVMWP. The AVMWP is created by the ROW Manager and identifies the facilities to be managed and any proposed work, with start and completion dates. When work is identified, a work order is created in Maximo and assigned to the appropriate crew.

Inspection details, including the inspector's name and the date and line section, are documented using Maximo and noted on the HHW Vegetation Management AWP. The HHW Line Crew, Vegetation Management Crew, and Watershed Keepers report additional corrective maintenance observed during daily work to the ROW VM Manager to generate a corrective maintenance work order through Maximo.

Table 6 shows that in 2021, 26 corrective maintenance work orders were issued, and 23 have been completed. The remaining three work orders were completed in early 2022. In 2022, 21 work orders were generated and all have been completed. The total completed for 2022 includes the three work orders carried over from 2021. The most common VM corrective maintenance along the distribution lines was tree trimming and removals to ensure compliance with GO 95 Rule 35.

Table 6 – Vegetation Corrective Maintenance Work Orders for Distribution

Year	Number of Work Orders	Total Completed
2019	45	45
2020	43	43
2021	26	23
2022	21	24

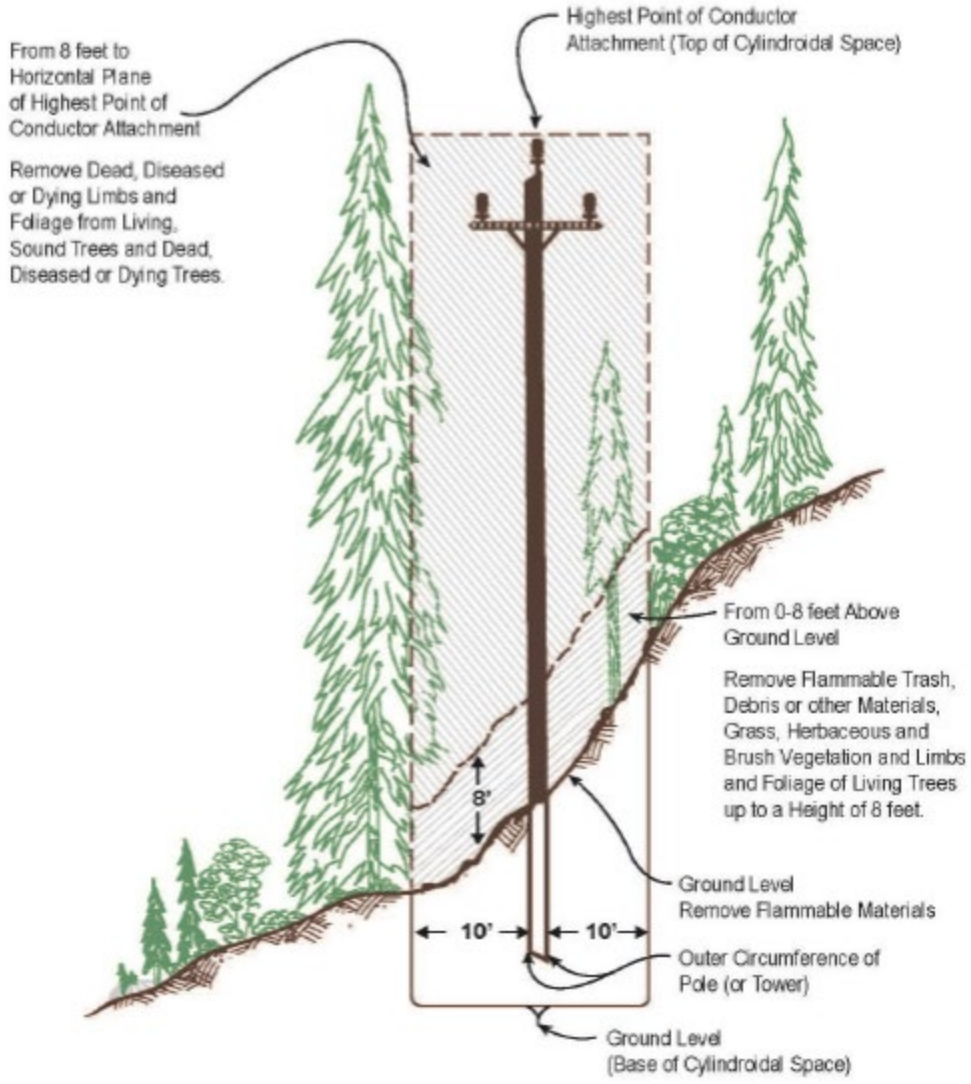
5.4.4 Vegetation Inspections / Substations. Switchyards, and Powerhouses

The SFPUC performs annual PRC § 4291 defensible space inspections around substations, switchyards, and powerhouses, including jointly operated substations with a neighboring utility. Inspections are tracked through ArcGIS including the type of work required (side trim, top, green removal, hazard side trim, hazard top, hazard removal) as shown in the dashboard (Figure 12).

5.4.5 Fire Break Clearance Requirements

The SFPUC meets the requirements of PRC § 4292. Poles that are identified as having non-exempt equipment (e.g., expulsion fuses and lightning arrestors) have annual preventative maintenance work orders to clear the base of the pole of all flammable materials and vegetation with a 10-foot radial circle down to bare mineral soil as well as removing all limbs and foliage up to a height of eight feet (Figure 11) The SFPUC regularly consults the CAL FIRE California Power Line Fire Prevention Field Guide and maintains an inventory in Maximo of all poles that host both exempt and non-exempt equipment, including equipment types such as cut-outs, switches, and lightning arrestors.

Figure 11 – PRC § 4292 Fire Break Clearance Requirements[15]



[15] Image taken from pg. 37 of the CAL FIRE California Power Line Fire Prevention Field Guide 2021 Edition

5.4.6 Herbicide Use

Herbicide treatments for the 230kV ROW follow the SFPUC ROW Integrated Vegetation Management Policy, supported by the San Francisco Planning Department's Preliminary Mitigated Negative Declaration for Rights of Way, where the 230kV ROW intersects with Stanislaus, Mariposa, and Tuolumne counties. The use of herbicides on SFPUC property and ROW is strictly controlled by the City and County of San Francisco and San Francisco's Integrated Pest Management Ordinance (Chapter 3 of the San Francisco Environment Code)[16].

5.4.7 Light Detection and Ranging (LiDAR)

In FY 2022-23 and 2023-24, we budgeted LiDAR flights to be performed on an alternating schedule with transmission lines flown one year and distribution lines the following year. In 2021, we contracted with a vendor to collect, process, and analyze all transmission lines, providing LiDAR and ortho imagery. We will use the LiDAR data to classify electric transmission line features, vegetation, ground features, and non -vegetation features within a 300-foot right of way. The LiDAR flight was flown again on March 29, 2022, and we are still working with the vendor to process the data. We are delaying the next LiDAR flight, planned for 2023 until we can analyze the data from the 2022 flight.

5.4.8 Satellite Vegetation Monitoring

In 2020, HHW began discussions with LiveEO, a software company that provides artificial intelligence (AI) satellite observation data specific to infrastructure assets, such as overhead electrical lines. We were most interested in the vegetation management capabilities given the increased turn round time for LiDAR data. LiveEO's artificial intelligence is applied to satellite data which identifies and locates hazard trees within the SFPUC's overhead electrical line footprint.

[16] https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_environment/0-0-0-160

With the increased number of satellites in orbit, a utility can get a complete overview of tree location and condition in near real-time. Starting in Q4 of 2023, LiveEO will begin providing the SFPUC with annual 3D vegetation mapping and vegetation encroachment analysis, which encompasses grow-ins (horizontal clearance), grow-ins (3D clearance), fall-ins (position), and access to the LiveEO report generation applications. We plan to use this information as a supplement to LiDAR flights; we will also validate the accuracy of information obtained using LiDAR versus satellite imagery using AI.

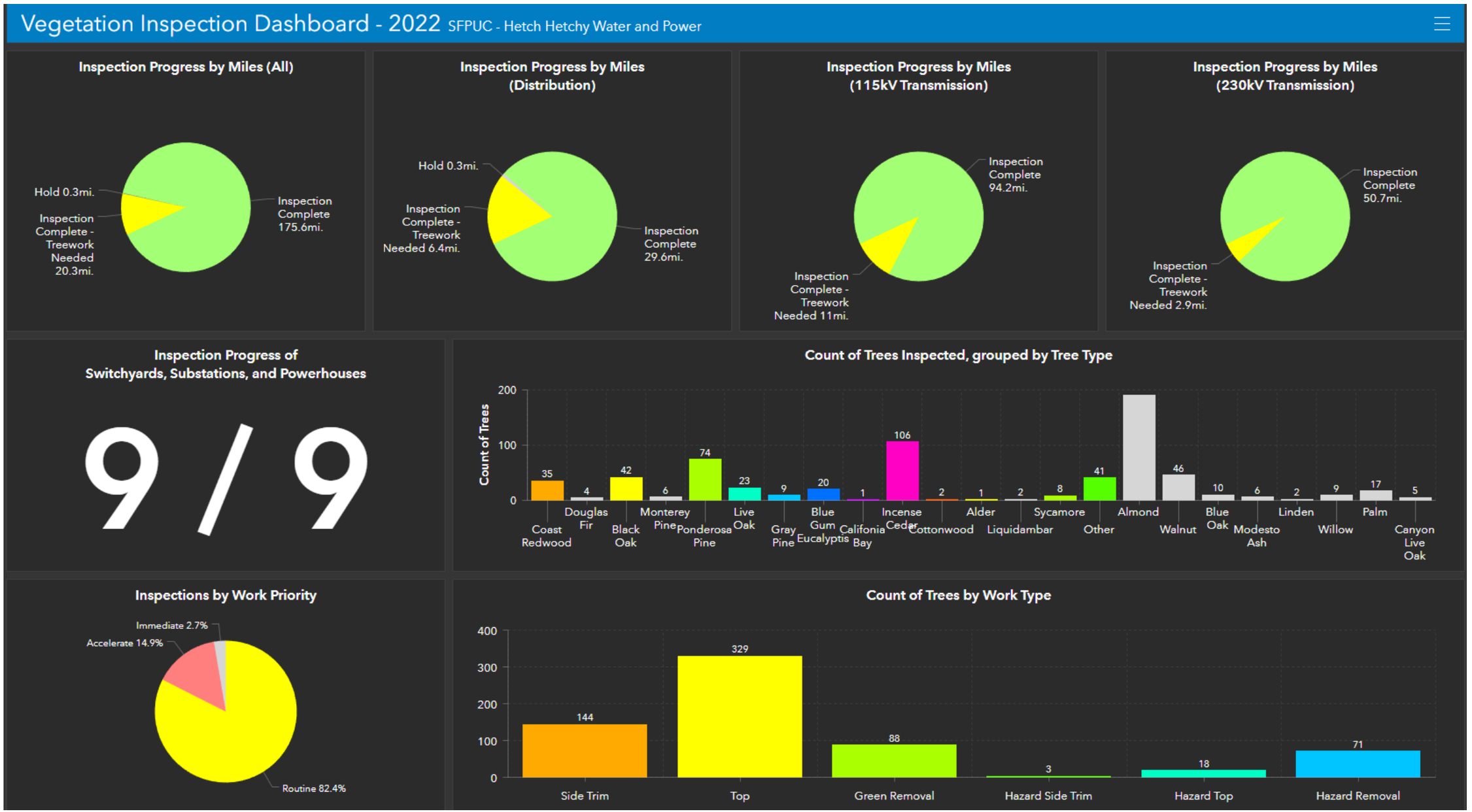
5.4.9 Vegetation Management Dashboard

In 2021, HHW began a pilot program for tracking vegetation inspections across the 230kV and 115kV transmission systems and the 22kV and 2.4kV distribution systems using an ArcGIS Field Maps collection program. Field Maps can display collected data in a dashboard format. The dashboard (Figure 12) displays data captured in a calendar year (January 1st to December 31st). 2022 is the first year Field Maps was used to capture the entire year of vegetation inspections.

The modules display overall inspection progress by miles for both transmission and distribution and divide these further into separate inspection tracking by distribution and transmission, switchyards, substations, and powerhouses. HHW will continue refining this dashboard to analyze important ROW trends including inspections by work priority and count of trees by work type to reduce high-priority and hazard tree work.

Now that the dashboard has matured and HHW has gained confidence in the data collection process and dashboard output capabilities, HHW will begin working with NRLM to implement this for vegetation management in the Peninsula watershed.

Figure 12 – Vegetation Management Dashboard



5.4.10 Integrated Vegetation Management (IVM)

The SFPUC has a ROW IVM Policy that applies to the entire SFPUC 230/115kV transmission ROW and distribution ROW. The IVM is considered the utility industry's best management practice (BMP) by federal and state land management agencies.

5.4.11 Wood and Slash Management

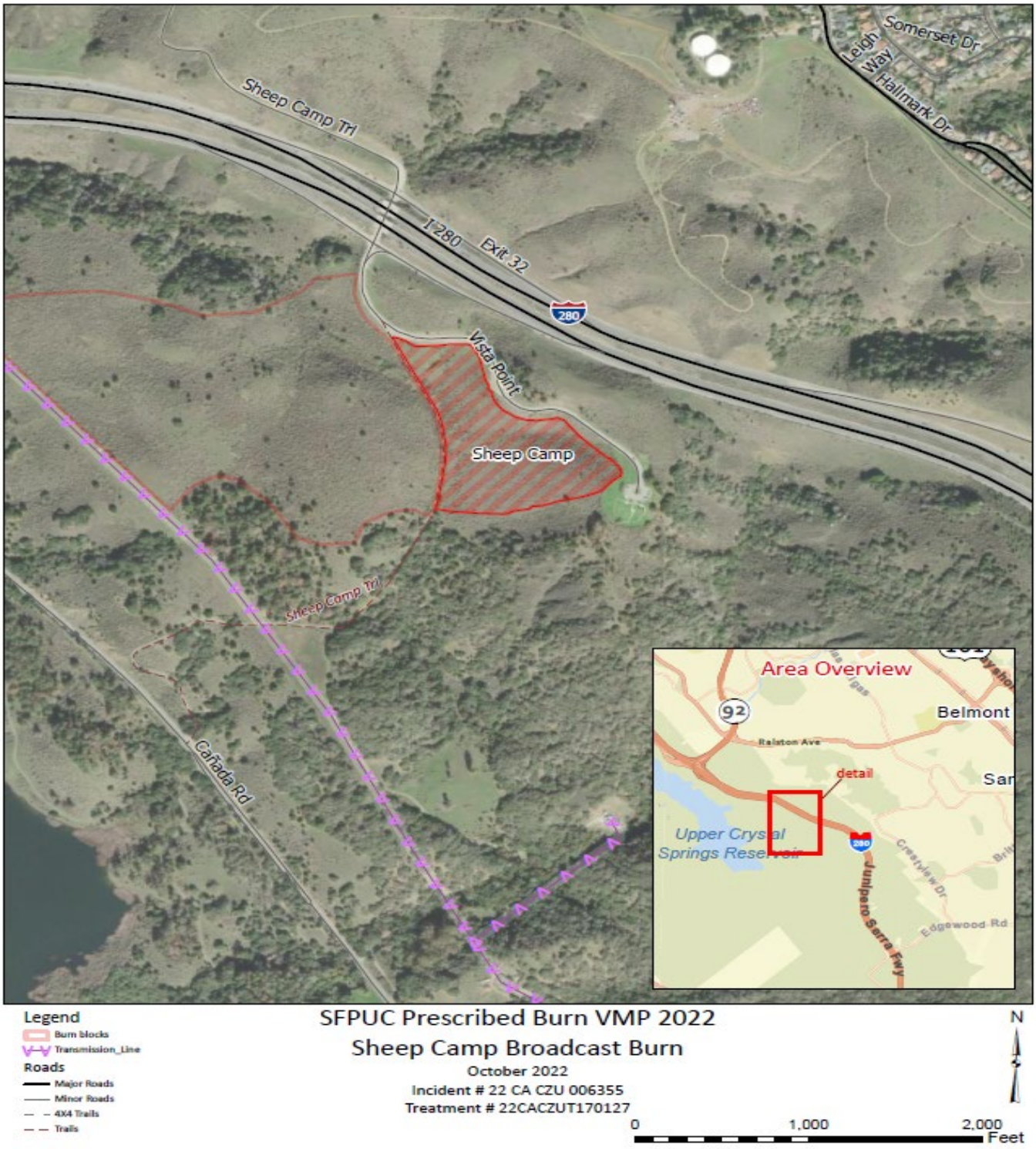
The SFPUC has two master as-needed tree services contracts that cover projects in the Central Valley going east to O'Shaughnessy Dam and projects in the Bay Area and Peninsula areas. The firms under contract hold D49 Tree Service Contractor Licenses and are Licensed Timber Operators (LTOs) with an "A" license or have an LTO available as a subcontractor.

In 2022, the SFPUC awarded seven projects under the Master As-Needed contracts for a total cost of $1,690,400. These projects range from removing brush near watersheds to the removal of hazard trees along the 230kV and 22kV transmission and distribution ROW.

NRLM in partnership with CAL FIRE conducted a 25 Acre prescribed burn on October 4th, 2022, on the Peninsula Watershed. The primary objective of the burn was to reduce brush densities and fuels within the Highway 280 corridor and the wildland-urban interface (Figure 13).

The secondary objective is to promote habitat enhancement and reduce brush encroachment in native grasslands. This project area is in a Tier 2 HFTD. This was the first burn of a larger 700-acre fuels reduction project with CAL FIRE, which is planned to take place over the next seven years.

Figure 13 – NRLM Prescribed Burn Area



5.5 Asset Inspections

The SFPUC meets or exceeds the minimum inspection requirements provided in CPUC GO 165, CPUC GO 95, Rule 18, and CPUC GO 174. Under these rules, the SFPUC inspects electric facilities as established in the general orders.

5.5.1 Work Order Documentation

The SFPUC documents all inspection results in Maximo including all findings that require remediation. All follow-up remediation work is prioritized based on SFPUC personnel assessment and tracked via Maximo until the work order is closed out.

5.5.2 Transmission Inspections and Maintenance

We own and maintain a total of 834 transmission structures. Detailed ground inspections are performed on a five-year cycle. Detailed ground inspections consist of checking the condition of access roads and gates, tower numbers, tower danger signs, tower concrete footings, grounding condition, vegetation surrounding the tower, steel tower members (checking for rust and condition of metal), and powerline tree and limb encroachments.

Aerial patrols of all 834 structures are performed annually by the HHW Line Crew and consist of a visual inspection of tower members and related hardware, dampers, conductors, and insulators. Any defects or deficiencies discovered through these patrols are reported to the Planning work group and a work order to correct the issue is generated through Maximo.

Table 7 shows that 140 inspections were scheduled in 2022, and all but two are complete, which were issued in late 2022. The tower inspections generated 96 corrective maintenance work orders. The transmission system's most common corrective maintenance work orders were removing dirt from around the tower footings, removing orchard encroachments, and fixing gates on tower access roads.

During the 2020-2022 Plan updates, the SFPUC line crew identified and documented all splices and bolted connections on the SFPUC transmission lines. Recurring preventative maintenance work orders were created with a job plan to thermal scan (infrared) transmission line splices, jumpers, insulators, and dead ends. Equipment that is found to be operating at 100 degrees Fahrenheit above ambient temperature is immediately replaced. Transmission lines were broken down into eight segments, with multiple towers in each segment. Each segment has a recurring preventative maintenance work order, and the findings are documented in the work order log in Maximo.

Table 7 – Transmission Tower Inspections

Year	Detailed Inspections Scheduled/Completed		Corrective Maintenance Work Orders Scheduled/Completed	
	Scheduled	Complete	Scheduled	Complete
2019	180	180	49	27[17]
2020	180	180	28	28
2021	114	114	40	28[18]
2022	140	140	96	94[19]
Total	626 (out of 834 Towers)			

5.6 Asset Maintenance

Under applicable industry standards, we perform the following asset inspections and maintenance of transmission, distribution, and substation facilities. Preventative maintenance work orders for detailed inspections and corrective work are managed

[17] The remaining 22 work orders were completed in 2020, in addition to the 28 reported.
[18] The remaining 12 work orders were completed in 2022, in addition to the 96 reported.
[19] The two remaining work orders were created in late December 2022. The completion status will be reported in the 2024 WMP update.

through Maximo.

5.6.1 Hot or Cold Wash

We conduct annual preventative maintenance by performing hot or cold washes of overhead line towers, insulators, switches, and equipment in substations and switchyards. The purpose of washing is to remove contaminants from the insulators and other associated hardware, which reduces the likelihood of tracking or arcing, which could degrade the equipment and could ultimately lead to failure (Figure 14). The assignment and completion of hot or cold washing work orders are tracked in Maximo. The line crew supervisor verifies the completion of the work orders.

Figure 14 – HHW Line Crew Hot Washing

5.6.2 Distribution Inspection and Maintenance

The SFPUC meets or exceeds the minimum inspection requirements of CPUC GO 165 for distribution lines. GO 165 establishes minimum requirements for electrical distribution facilities regarding inspections (patrols, detailed, and intrusive inspections), condition ratings, schedule, remediation of corrective actions, and reporting and record-keeping to ensure safe and reliable electrical service. The SFPUC contracts with a helicopter vendor to patrol distribution lines annually with the SFPUC line crew QEW. During the aerial patrols, the QEW looks at the tops of the poles for rot and damage. Intrusive pole inspections are performed on a 10-year cycle. The SFPUC has four total miles of underground distribution lines located in the Tier 2 HFTD. Corrective maintenance work orders are created during the inspection and assigned a priority. Table 8 shows the number of corrective maintenance work orders issued in 2022 versus the number completed. The SFPUC has inventoried all distribution poles in Maximo.

Table 8 – Corrective Maintenance for Distribution System

Year	Number of Work Orders	Total Completed
2019	4	4
2020	37	37
2021	30	26[20]
2022	14	12[21]

5.6.3 Powerhouse/Substation/Switchyard Inspections and Maintenance

The SFPUC meets or exceeds the requirements of CPUC GO 174, Rules for Electric Utility Substations. The SFPUC performs detailed substation/switchyard inspections monthly (Table 9) and records findings and completion dates in Maximo. Any

[20] These four remaining work orders were completed following the submission of the 2022 WMP.
[21] The two remaining work orders were issued in late 2022. Completion status will be included in the 2024 WMP update.

maintenance or repairs are reported to the Planning team and a corrective maintenance work order is generated in Maximo.

Table 9 – Substation/Switchyard Inspections

2022 Calendar Year Substation/Switchyard Inspections				
Month	Moccasin	Intake	Warnerville	Calaveras
Jan	1/4/2022	1/13/2022	1/8/2022	1/1/2022
Feb	2/8/2022	2/23/2022	2/5/2022	2/5/2022
Mar	3/15/2022	3/9/2022	3/6/2022	3/1/2022
Apr	4/12/2022	4/8/2022	4/9/2022	4/2/2022
May	5/18/2022	5/6/2022	5/21/2022	5/7/2022
June	6/8/2022	6/9/2022	6/4/2022	6/5/2022
July	7/12/2022	7/8/2022	7/1/2022	7/6/2022
Aug	8/9/2022	8/9/2022	8/7/2022	8/3/2022
Sep	9/14/2022	9/7/2022	9/10/2022	9/7/2022
Oct	10/18/2022	10/7/2022	10/8/2022	10/2/2022
Nov	11/3/2022	11/2/2022	11/5/2022	11/4/2022
Dec	12/13/2022	12/9/2022	12/12/2022	12/2/2022

The SFPUC performs annual infrared inspections on transformers, switches, and circuit breakers in switchyards/substations. Preventative Maintenance work orders are set up in Maximo. Table 10 below shows the asset, equipment, and frequency of infrared inspections.

Table 10 – Infrared Frequencies

Asset	Equipment	Frequency
Powerhouses	Connectors, Switches, and Circuit Breakers	Annual
Powerhouses	13.8kV bus way between GSU and Switchgear	3 Month
Switchyards/Substations	Connectors, Switches, and Circuit Breakers	Annual
Towers	Test Shoes, Connectors, and Splices	Annual
Transmission Line Segments	Test Shoes, Connectors, and Splices	Annual
Poles	Transformers	Bi-Monthly

5.6.4 Defensible Space Inspections

HHW performs annual preventative maintenance defensible space inspections that conform with PRC § 4291 around buildings and structures. These inspections include areas around substations, switchyards, and powerhouses. Vegetation is removed around facilities to maintain, at minimum, a 100 ft. radius of defensible space.

5.7 Asset Management

During the 2020-2022 Plan updates, the SFPUC began and completed a comprehensive audit to ensure all transmission, distribution, and substation assets are documented in Maximo. This initiative was completed in Q1 of 2023. One of the major accomplishments of this initiative was updating the database with a current count of all primary and secondary distribution poles with height, class, installation date, and installed equipment, including if the poles supported telecom equipment.

5.8 Workforce Training

We have implemented complementary training programs for our workforce to support a safer work environment, ensure continuous improvement, and help reduce the risk that our facilities could be the origin or contributing source for the ignition of a catastrophic wildfire.

5.8.1 Basic Fire Training

Each spring, HHW requires all staff to attend a basic fire training workshop. The training consists of basic fire training regarding minimizing potential fire dangers, practicable actions to suppress fires, the importance of reporting fires, basic fire safety, and the use of fire mitigation and suppression equipment, including hand tools, fire extinguishers, and water pumps. The training is conducted by retired CAL FIRE captains with extensive backgrounds in fire prevention and basic immediate mitigation actions. This training supports the increased fire preparedness and response capabilities of the HHW field staff and other support staff.

5.8.2 NRLM/WSTD First Responder Training

NRLM/WSTD host an annual first responder meeting for agencies with emergency response responsibilities in Alameda and Santa Clara counties. The purpose of this meeting is to coordinate emergency communications protocols, share information on upcoming projects, and provide an outlook for the fire season. Representatives include CAL FIRE, Alameda and Santa Clara County Sheriff's Office, California Highway Patrol, PG&E, East Bay Regional Park District, Fremont and Santa Clara counties Fire Department, and the California Department of Fish and Wildlife.

5.8.3 VM Training

In 2022, COVID-19 disrupted the annual VM refresher training. This training is normally conducted on an annual basis for ROW VM crew(s). The training is scheduled to be updated and reviewed with trainees in 2023 to discuss all current vegetation clearance regulations per GO 95, Rule 35; PRC §§ 4292 & 4293; and NERC FAC-003-4.

5.9 Recloser Policy

The SFPUC utilizes automatic reclosers for system reliability. Reclosers are used to attempt to automatically restore service following an event that results in the recloser operating. For certain types of risk events, the automatic operation of the recloser could introduce a higher degree of risk for ignition of a wildfire during elevated or extreme fire weather conditions.

During the 2020-2022 Plan updates, the SFPUC procedure was to disable all automatic reclosers when the Adjective Fire Danger Rating condition changes to "high." The automatic reclose function would remain off until the condition is reporting "Low", usually following the onset of fall/winter precipitation, and the burn environment is no longer conducive to large wildfires.

When a risk event occurs during periods when reclosing is disabled, field personnel will perform an aerial or ground inspection of the line, from the recloser to the end of

the line, before restoring service. If a fault (failure) is identified, it will be repaired or made safe before re-energizing the line.

Due to the limited number of SFPUC circuits or circuit segments within the HFTD, there are no reliability or customer impacts due to the reclosers being disabled.

In 2023 the SFPUC will continue with the current process for disabling reclosers and will also begin testing and validating the Wildfire Analyst™ risk model's Fire Potential Index (FPI) prediction tool to establish daily operating conditions. The goal is to have the Wildfire Analyst™ FPI fully tested and operational in 2023 and begin using the daily FPI output to inform daily operational decisions including when to disable and enable the automatic reclose function of reclosers.

5.10 Operational / Emergency Response Procedure

The SFPUC has three primary methods for being notified of a system event. When the SFPUC learns of a system event they will dispatch the appropriate field personnel to investigate.

1. Notification via the SFPUC Supervisory Control and Data Acquisition (SCADA) system

    a. The Control Center personnel will dispatch the appropriate field personnel to investigate the cause of the SCADA alarm.

2. Notification by personnel when the issue is identified on a patrol

    a. When an issue of concern that requires immediate attention is identified on a field patrol, the issue will be remediated as follows:

        i. Immediate remediation if the issue poses or could pose a threat to public safety, or

ii. If the issue does not pose a threat to public safety, it will be reported to the Planning team and a work order will be generated through Maximo to correct the issue.

3. First responder agency

    a. The SFPUC will dispatch field personnel anytime they are requested by a first responder agency.

When critical fire weather is forecasted or an RFW is issued by the NWS, the powerhouse control center will dispatch Qualified Electrical Workers (QEW) to patrol power lines and standby for potential de-energization. The control center stays in constant communication with SFPUC management regarding changing weather conditions to monitor for and execute a de-energization event if those triggers are met.

During wildfire events that threaten SFPUC assets each division (HHW, NRLM, and WSTD) will initiate an ICS structure to manage the event, respective to where the fire is occurring. Each division assigns a Liaison Officer to coordinate with emergency response agencies, local government agencies, and SFPUC leadership.

5.11 De-energization for Public Safety

During critical fire weather conditions, the SFPUC may, as a measure of last resort, de-energize transmission and/or distribution lines to reduce the risk that SFPUC facilities could be the origin or contributing source for the ignition of a catastrophic wildfire. This strategy has minimal impacts on SFPUC operations, and minimal impacts on the SFPUC's water delivery operations to the Bay Area, hydro generation operations, interconnected utilities, and the California Independent System Operator (CAISO) grid.

The SFPUC continues to evaluate the de-energization criteria other utilities use in decision-making processes and leverage best practices most applicable to the fire

risks associated with SFPUC facilities. The SFPUC currently considers CAL FIRE and USFS fire danger ratings, NWS weather forecasts including Red Flag Warnings, real-time sustained wind speeds and wind gusts, temperature, and relative humidity as inputs for deciding when to de-energize a line for public safety. Additionally, the weather forecast, and fuel information described below, relating to potential fire risk conditions are automatically provided via email notifications to HHW staff as additional inputs to inform decisions to de-energize HHW facilities:

1. Adjective Fire Danger Indices (i.e., 'Low' 'Moderate', 'High', 'Very High', and 'Extreme') at Mount Elizabeth.
2. Average wind speed and maximum wind gust gridded forecasts. Obtained from High-Resolution Rapid Refresh Model 3-km, hourly resolution, issued once per hour.

When the thresholds specified below are met, an email message is generated automatically and sent to the HHW Moccasin Control Center mailing list and additional HHW staff. These thresholds are comprised of:

1. Wind thresholds; either of two conditions:
   a) Hourly sustained wind speeds greater than 25 mph, or
   b) Wind gusts greater than 45 mph
2. Adjective Fire Danger Rating of any severity greater than 'Low' (i.e., 'Moderate', 'High', 'Very High', or 'Extreme').

HHW staff will evaluate the above weather information and based on operating experience and historical system performance, decide if de-energizing electrical facilities for public safety is warranted. If it is decided to de-energize transmission and/or distribution facilities, HHW staff will direct the operations personnel to de-energize determined facilities.

The HHW staff will continue monitoring the critical fire weather conditions. When fire risk conditions improve, they will direct operations personnel to begin the process to re-energize the facilities as outlined in Section 5.11.3 – Restoration of Service.

In 2022, the SFPUC did not de-energize any circuits for public safety. Historical outage dates for de-energization events for public safety are listed in Table 11.

Table 11 – De-Energization Events for Public Safety

Year	Name of Circuit	Dates of Outages	Number of Customers Served by Circuit	Number of Customers Affected	Measures Taken, or Planned to Be Taken, to Reduce the Need for and Impact of Future de-energization for the safety of the Circuit(s)
2020	KPH to OSH 22kV line	Jun 25-26 Aug 8-9 Sep 20-21 Sep 27-28	0	0	1. Circuit feeds SFPUC loads with no customer impacts. Proactive de-energization is currently used and preferred as the primary wildfire risk mitigation measure. 2. The SFPUC is evaluating the cost and feasibility of converting this portion of the overhead circuit to underground. 3. The SFPUC is evaluating the cost and feasibility of building a remote microgrid at the load center(s) and removing the overhead facilities.
2021	KPH to OSH 22kV line	Jan 26-31 Mar 29-30 Apr 27-28 Jul 29-30 Jul 30-31 Sep 9-11 Oct 12-13	0	0	
2022		No Events			

PG&E is the source feed to some SFPUC distribution line segments in the Peninsula and Bay Area that provide electrical service to SFPUC-owned and operated facilities. These lines are maintained by WSTD. A PG&E-initiated PSPS in the Peninsula and Bay area that is the source feed to SFPUC distribution line segments will impact SFPUC facilities due to a PG&E-initiated PSPS. WSTD coordinates with PG&E before, during, and after a PG&E-initiated PSPS event. When PG&E notifies

WSTD that a PSPS will be initiated on the source feed to WSTD line segments, WSTD will request HHW line crews to de-energize the WSTD lines, as well as the patrol and re-energization following the PSPS event.

The SFPUC has provided a list of SFPUC-owned critical facilities to PG&E with the associated contact person(s). PG&E and the SFPUC have exchanged company representative contact information for communication during a potential PSPS event. Several SFPUC staff also have access to the PG&E PSPS Portal and can review pertinent information in real time. SFPUC staff can also participate in coordination calls that occur during an active PG&E PSPS.

Communications with PG&E before, during, and after a PG&E-initiated PSPS has continued to improve over time. The SFPUC is also very proactive and will often contact the PG&E representative before PG&E makes notifications regarding a potential PSPS. The SFPUC has a combination of permanent and mobile temporary backup generators for locations identified as having the potential for being impacted by a PG&E PSPS. The SFPUC communicates with PG&E before a PSPS event and can mobilize temporary generators to those facilities that do not have permanent standby generators.

5.11.1 Impacts on Public Safety

The SFPUC has not identified any impacts on public safety when the SFPUC de-energizes power lines during critical fire weather events.

5.11.2 Customer Notification Protocols

The SFPUC is primarily a generation and transmission provider that transmits SFPUC-generated hydropower over our transmission network and into the CAISO market. Other than the three retail customers, the SFPUC distribution system serves all SFPUC-owned and operated loads (facilities).

The SFPUC uses internal notification protocols when critical fire weather conditions are met or forecasted to be met. The HHW control center notifies affected entities by phone and email for both planned and unplanned outages. The SFPUC has three retail customers. Two are connected directly to the distribution system and one is connected to the transmission system. The two customers served off the distribution line are located within the HFTD and have backup generators.

The third customer is in the non-HFTD and is served through the transmission system. The SFPUC collaborates with the stakeholder(s) regarding unplanned power interruptions and potential proactive de-energization events.

5.11.3 Restoration of Service

During a PSPS or de-energization event, SFPUC leadership will continue to monitor critical fire weather conditions throughout the region. When critical fire weather conditions subside, the Division leadership will give an “all clear” to begin the process of returning the lines to service. Staff must conduct an entire line patrol, from the point of de-energization to the end of the line, to ensure the line is safe to energize. Line patrols will be conducted via helicopter, vehicle, or foot, depending on weather conditions and access to facilities. Priority for patrols and restoration will be given to the transmission system first, followed by the distribution system, or as determined by operational needs.

The SFPUC maintains a contract task order with a helicopter service and can call on them to conduct aerial patrols. Using a helicopter for patrols significantly reduces the time required to complete a patrol, provided weather conditions have improved enough for safe flight operations. Following a wildfire, we will restore service when it is safe for staff to access the damaged area(s). The SFPUC will not access burn areas until the agency having jurisdiction (i.e., CAL FIRE, USFS, local fire agency) grants permission to enter the burn area to conduct a damage assessment. Following a full damage assessment, if required, we will perform repairs, and restoration will proceed following established priority and restoration procedures.

6. STAKEHOLDER OUTREACH AND ENGAGEMENT

6.1 Fire Agency (First Responder) Collaboration

The SFPUC continues to collaborate with multiple stakeholders to assess areas where there is or could be a risk for a catastrophic wildfire. This work supports our continuous effort to improve wildfire mitigation strategies and enhance fire safety throughout the region. The SFPUC participates as a partner on the USFS Southwest Interface Team (SWIFT)[22], a partnership that includes CAL FIRE, BLM, Tuolumne County, and private landowners. SWIFT is a group comprised of a variety of government and external partners that work collaboratively to create fire-adapted communities. SWIFT meets every month and, since 1999, has planned and implemented wildfire protection activities within the 132,000-acre (~206 sq. mi.) area of southern Tuolumne County and western Mariposa County. Additionally, they cooperatively plan and implement strategic fire fuel break systems designed to reduce the threat of loss of life, property, and resources in the southern Tuolumne and western Mariposa County wildland-urban interface.

In Alameda and San Mateo counties, the SFPUC organizes an annual first responder liaison meeting in coordination with CAL FIRE to supplement ongoing communication with all first responders, including the county sheriff's office and local fire departments. The SFPUC watershed lands in these two counties are State Responsibility Areas (SRA), and SFPUC staff are in regular communication with local CAL FIRE staff throughout the calendar year.

The SFPUC continues collaboration with CAL FIRE's Tuolumne-Calaveras Unit which owns and operates a Firehawk helicopter stationed at the Columbia Airport, approximately 22 miles from the SFPUC Moccasin Powerhouse / Switchyard / Control Center (Figure 15). The primary benefit of the Firehawk helicopter is the increased water carrying capacity of up to 800 gallons and if a wildland fire ignites

[22] https://www.fs.usda.gov/detail/stanislaus/home/?cid=stelprd3810191

near SFPUC assets, the Firehawk helicopter could be deployed and arrive within minutes and conduct an initial attack to reduce fire spread potential.

Figure 15 – CAL FIRE Firehawk Helicopter

The SFPUC developed a Fire Dipping Strategy procedure that is shared with CAL FIRE, Yosemite National Park, and the USFS. The purpose and scope of the plan are to provide a reservoir dipping strategy that considers both water quality and firefighting efforts. The SFPUC owns and operates drinking water reservoirs for the City of San Francisco and the Bay Area. Fire response agencies use these reservoirs to pull water during fire suppression activities. Because of water quality risks, the SFPUC has ensured that partner agencies understand the benefits and risks and require the appropriate staff to be contacted before dipping from SFPUC reservoirs.

The SFPUC's Wildfire Mitigation Planning Group is led by the WMRA with participation from managers and field staff from HHW, NRLM, and WSTD. The group's purpose is to coordinate wildfire mitigation projects, activities, and best practices across all SFPUC divisions. The group meets monthly, with an agenda prepared before each meeting and the opportunity for each member to provide discussion topics. The SFPUC divisions responsible for performing wildfire mitigation activities cover a significant geographical area. The coordination of work performed

by this planning group has proven to be an efficient and effective way to share resources, provide project updates, and coordinate programs to ensure the SFPUC consistently complies with all local, state, federal, and regulatory requirements in a continuous effort to reduce the risk of SFPUC assets being the origin or contributing source for a catastrophic wildfire.

6.2 SFPUC Relationship with PG&E

The SFPUC owns and operates critical water, power, and sewer facilities across multiple counties in Northern California. The SFPUC transmission system has interconnections with the California transmission grid via PG&E's electrical grid. PG&E and the SFPUC maintain ongoing dialogue regarding potential PG&E actions that could impact SFPUC facilities.

PG&E continues to support the SFPUC in the implementation of the Wildfire Analyst™ modeling tool. PG&E permitted the SFPUC and Technosylva to use the PG&E FPI algorithms to develop the SFPUC risk indices. Since the majority of SFPUC electrical assets are within the PG&E service territory, the benefit of PG&E sharing their FPI data is that using the same data sources will allow the SFPUC to have an FPI model consistent with the PG&E FPI[23] model which has been tested and validated.

6.3 California Municipal Utilities Association (CMUA) Collaboration

The CMUA established six working groups to support the POUs in the development of the WMPs by sharing information and utility best practices in the areas listed below. The SFPUC participated in the working sessions of each workgroup:

1. Metrics Working Group
2. Vegetation Management Working Group
3. Asset Management Working Group

[23] See PG&E's 2023-2025 WMP Section 8.3.6, Fire Potential Index (Rev 1, dated April 6, 2023). *Available* at 2023-2025 Wildfire Mitigation Plans (pge.com)

4. Grid Design and System Hardening Working Group
5. Risk Modeling Working Group
6. Climate Change Working Data Working Group

7. EVALUATING PERFORMANCE OF THE PLAN

7.1 Metrics and Assumptions for Measuring Plan Performance

We track the following transmission and primary distribution system metrics to measure the performance and effectiveness of our Plan in reducing the risk of SFPUC facilities being the origin or contributing source for the ignition of a catastrophic wildfire. In 2022, we adopted the outcome and performance metrics recommended by the WSAB. In addition, we analyzed our data going back to 2019. Outcome and performance metrics are summarized in Table 12.

Table 12 – Outcome and Performance Metrics

Metric	Metric Description	2019	2020	2021	2022
Outcome Metrics					
1	Vegetation inspections were completed in an HFTD (Through a combination of aerial and ground inspections).	Completed	Completed	Completed	Completed
2	Transmission Line Inspections – aerial	Completed	Completed	Completed	Completed
3	Distribution Line Inspections – aerial	Completed	Completed	Completed	Completed
Performance Metrics					
1	Reportable ignitions in the HFTD associated with SFPUC electric facilities (see Section 9.4)	0	1	1	0
2	Number of times a circuit or circuit segment is de-energized within the HFTD	1	4	7	0
3	Wire down in HFTD	1	2	1	0
4	Wire down outside HFTD	0	0	0	0

7.2 Metric 1: Fire Ignitions

For purposes of this metric, a fire ignition must meet the following criteria:

1. SFPUC facility was associated with the ignition of the fire.
2. The fire was self-propagating and of a material other than electrical and/or communication facilities.
3. The resulting fire traveled greater than one linear meter from the ignition point.
4. SFPUC has knowledge that the fire occurred.

7.3 Metric 2: Wires Down

The second metric is the number of SFPUC transmission or primary distribution wires down. For purposes of this metric, a wire-down event includes any instance where an electric transmission or primary distribution conductor falls to the ground or onto a foreign object. We differentiate this metric into wires down "inside" and "outside" an HFTD.

7.4 Impact of Metrics on Plan

The SFPUC continues to document and monitor metrics to measure the performance of the WMP to reduce the risk that SFPUC facilities will not be the origin or contributing source of a catastrophic wildfire. The SFPUC will continue to evaluate system performance and identify additional metrics to measure the fire risk reduction gained year after year.

During the 2020-2022 Plan updates, the SFPUC transmission and distribution systems performed exceptionally well and experienced favorable system reliability. There was one ignition event in 2020 and one in 2021 attributed to SPFUC distribution assets when a tree fell and contacted the lines. Lessons learned from these events resulted in revising the wind speed thresholds, for proactive de-energization of the 22kV distribution lines in the Tier 2 HFTD and the removal of additional danger trees adjacent to the overhead lines. The SFPUC will continue to

monitor metrics and evaluate trends that may require a review and possible revision to construction, inspection, and/or maintenance standards. The SFPUC also monitors incidents and root cause analysis at other utilities to determine if the SFPUC is at risk for a similar type of event and put measures in place to minimize the risk of similar events occurring throughout the SFPUC overhead electrical assets.

7.5 Monitoring and Auditing the Plan

The WMRA and SFPUC staff monitors projects and metrics outlined in this WMP to identify areas of improvement and goals so that SFPUC facilities will not be the origin or contributing source of a catastrophic wildfire. Execution of hardening projects, proactive inspection programs, preventative maintenance programs, and data collected will inform the SFPUC staff of system improvements and areas that need additional attention. The SFPUC staff are committed to operating a safe and reliable power grid while reducing the risk of SFPUC facilities being the source of ignition for a catastrophic wildfire.

7.6 Corrective Action Program

We are committed to making our Plan effective and robust. We also understand that identifying gaps and areas for improvement in our Plan is a continuous process, learned through experience and monitoring industry best practices. During the 2020-2022 Plan updates, we made several changes to our Plan due to new policies, strategies, changes in technology, or identifying previously unidentified risks. We will continue to correct any gaps or deficiencies promptly. Changes will be incorporated into our Plan and submitted to the SFPUC Commission for approval annually, subsequently submitted to the WSAB.

7.7 Monitoring the Effectiveness of the Plan

We strive for continuous improvement to reduce the risk of SFPUC facilities being the origin or contributing source of a catastrophic wildfire. We will continuously

monitor and evaluate the wildfire mitigation efforts described in our Plan and pursue improvements in our ongoing goal of providing safe and reliable water and power to the region.

8. INDEPENDENT EVALUATOR

PUC § 8387(c) requires the SFPUC to contract with a qualified IE with experience in assessing the safe operation of electrical infrastructure to review and assess the comprehensiveness of this Plan.

For the initial SFPUC 2020 WMP, the SFPUC engaged the services of a local consulting firm to provide an independent evaluation of our 2020 WMP. The local consulting firm employed a former investor-owned utility executive with 40 years of electric operations experience to lead the team to evaluate the SFPUC WMP. The IE team determined that the SFPUC 2020 WMP was comprehensive and met all the requirements of PUC § 8387. The above-mentioned IE also evaluated this 2023 Comprehensive Plan update.

The SFPUC's Plan is updated annually and will be evaluated by an IE every three years when comprehensive updates to the Plan are made. The IE reviewed this 2023 comprehensive Plan update and presented his report to the SFPUC Commission.

The IE report is submitted to SFPUC's Commission along with the request for final approval of the SFPUC WMP.