



**Jay Leyno**  
Director  
Wildfire Mitigation PMO

Mailing Address: P.O. Box 7442  
San Francisco, CA 94120  
Telephone: (925) 239-3126  
Email: Jay.Leyno@pge.com

August 7, 2023

**BY ELECTRONIC COMMUNICATION**

Melissa Semcer, Deputy Director  
Office of Energy Infrastructure Safety (Energy Safety)  
California Natural Resources Agency  
715 P Street, 20<sup>th</sup> Floor  
Sacramento, CA 95814

Re: PG&E's 2023 Wildfire Mitigation Plan – Final Revision Notice Response  
(Docket #2023-2025 WMPs)

Dear Deputy Director Semcer:

In compliance with the Office of Energy Infrastructure Safety's (Energy Safety) Revision Notice for Pacific Gas and Electric Company's 2023-2025 Wildfire Mitigation Plan (Revision Notice), we provide the following:

- Responses to Critical Issues RN-PG&E-22-01, RN-PG&E-22-02, RN-PG&E-22-03, RN-PG&E-22-04, RN-PG&E-22-05, RN-PG&E-22-06, RN-PG&E-22-07, and RN-PG&E-22-08;
- A revised version of our 2023-2025 WMP Base Plan that includes changes resulting from the Revision Notice Responses, in both a redlined and a clean version of the document; and
- A single updated WMP and auxiliary Excel file updating tables required in the 2023-2025 WMP that incorporates all required changes across all Critical Issues.

Consistent with the Revision Notice direction, we are submitting these items to the 2023 Wildfire Mitigation Plans docket (#2023-2025 WMPs).

Below we provide additional information and context relating to our 2023-2025 WMP Revision Notice submission.

#### PG&E's Commitment to Wildfire Safety

Energy Safety and PG&E share the same goal of stopping catastrophic wildfires. PG&E has made significant progress in mitigating catastrophic wildfire risk since 2019, achieving a 90% reduction in wildfire risk across our service area using our layers of protection approach. We estimate that number will increase to 94% in 2023. PG&E has also demonstrated our commitment to wildfire reduction by increasing investments in wildfire mitigations by more than \$2 billion dollars from 2019 to 2024 (\$3.84 billion in 2019 to \$6.17 billion in 2024).

Several of the Revision Notice items include requests that create operational execution challenges and result in incremental financial pressure, which can be reduced through alternative approaches that achieve equivalent risk reduction. Below we provide our approach to the three Critical Issues that raise these challenges. Additional information is provided in the Revised 2023-2025 WMP.

- **RN-02 Quality Targets:** PG&E plans to evolve from a check-the-checker model and transition to a process that embeds quality at the source by integrating QC with execution processes to drive quality during initial work execution. Creating QC targets and minimum pass rates limits PG&E's ability to reallocate resources to improve overall work execution and performance across our VM programs, as needed, due to finite workforce resources. Currently, all the 2023 identified QA programs are meeting<sup>1</sup>, or exceeding, the 95% AQL targets for both Vegetation Management and System Inspections programs. By being flexible with how we deploy our quality management resources, we can mitigate \$20 million in annual costs to our customers in 2024 and 2025 and yet achieve comparable quality performance results.
- **RN-04 Asset Repairs:** PG&E is revising our approach to addressing the growing open maintenance log of distribution asset repairs by 2029—three years sooner for the non-ignition tags than we proposed in our March 2023 WMP submittal. Instead of working newly created tags to meet the GO 95 time requirements<sup>2</sup>, we will accelerate our program by bundling and working tags by circuit isolation zone. Bundling by isolation zone provides us the flexibility to address the most risk through a risk-spend efficiency approach and will provide nearly \$1 billion in execution efficiency through 2029 with equivalent risk reduction, as compared to the plan we proposed in our March 2023-2025 WMP. Bundling work in isolation zones also reduces the number of customer clearances required and subsequently improves customer experience. Through bundling in isolation zones, PG&E's asset maintenance teams coordinates with other functional areas such as vegetation management so that customers only experience one planned outage while we complete all the work needed in that zone at one time.
- **RN-06 Vegetation Management Inspection Programs:** PG&E has established targets for Vegetation Management for Operational Mitigations (VMOM) for 2024-2025 and Focused Tree Inspection (FTI) for 2023-2025. Our original proposal for FTI and VMOM did not include targets for 2024 or 2025 because our original plan envisioned developing our 2024 and 2025 plans based on the outcomes from the FTI and VMOM pilots we are conducting in 2023. Accounting for the full scope of the programs' targets for 2024 and 2025 increases our estimated costs. We have also identified additional costs related to our FTI program as a result of our Revision Notice benchmarking with Southern California Edison (SCE) and San Diego Gas and Electric Company (SDG&E) about our VM programs. During benchmarking we identified opportunities to adjust our level of inspection. We are committed to making improvements in this area by conducting Level 2 inspections on all strike trees in the 1,800 miles covered by the FTI program in 2024.

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<sup>1</sup> As of August 3, 2023 the Distribution System Inspection QA AQL is 94.7%.

<sup>2</sup> See Table 8.1.7-1 in Section 8.1.7.2 of the 2023-2025 WMP for a table outlining General Order 95 Rule 18 timelines.

Critical Issue	Description	Incremental Cost to Address Critical Issue <sup>(a)</sup>	Incremental Cost to Address Critical Issue as Proposed by PG&E in our Revision Notice Response <sup>(b)</sup>
RN-PG&E 023-01	Many of PG&E's 3-year and 10-year Initiative objectives do not meet Energy Safety requirements as outlined in the Technical Guidelines.	N/A <sup>(c)</sup>	N/A
RN-PG&E 023-02	PG&E does not Provide Sample Sizes and target pass rates for certain asset and vegetation management quality assurance and control programs as required by the Technical Guidelines.	\$40M	\$0
RN-PG&E 023-03	PG&E has not adequately demonstrated workforce planning and resource allocation to address both EPSS risk and wildfire risk.	N/A	N/A
RN-PG&E 023-04	PG&E does not demonstrate how it will address its growing backlog of asset repairs.	\$0 <sup>(c)</sup>	\$(300M) <sup>(c)</sup>
RN-PG&E 023-05	PG&E's undergrounding plan may leave wildfire risk unaddressed in highest risk areas.	N/A	N/A
RN-PG&E 023-06	PG&E does not provide targets for seven of its vegetation management inspection programs.	\$370M	\$370M
RN-PG&E 023-07	PG&E does not adequately address its risk from hazard trees	N/A	N/A
RN-PG&E 023-08	PG&E's PSPS decision-making process does not accurately account for EPSS enabled circuits which could potentially lead to more PSPS events than needed	N/A	N/A
<b>Total Incremental Cost</b>		<b>\$410M</b>	<b>\$70M</b>

(a) Forecasts represent PG&E's best estimate of the potential incremental cost to customers associated with directly addressing the critical issues in the Revision Notice from 2023 to 2025

(b) Forecasts represent PG&E's best estimate of the potential incremental cost to customers based on PG&E proposal alternative to achieve equivalent risk reduction from 2023 to 2025.

(c) The estimated incremental costs represented for asset repair backlog is a comparison of the two methods of addressing the critical issue and does not account for the resource impact due to increased find rates during asset inspections. As explained in the 2023-2025 WMP, PG&E has seen our inspection find rates steadily increase in recent years. See 2023-2025 WMP, R1, pp. 457-458. PG&E notes that with equivalent risk reduction, this approach will provide nearly \$1 billion in execution efficiency through 2029, as compared to the plan we proposed in our March 2023-2025 WMP.

Miscellaneous Critical Issue Response Items

Additionally, we note the following for consideration when reviewing our Revision Notice responses and the Revised 2023-2025 WMP being submitted today:

- In each Critical Issue response, PG&E has divided the Required Remedies from Energy Safety into various parts to make the lengthy responses easier to follow. For example, PG&E’s response to RN-PG&E-22-03 is divided into four parts: a, b, c, d. As with our original 2023-2025 WMP, the Remedy language is presented in *italics*. The Remedy language is then followed immediately by our response.
- We are providing an attachment table that identifies where supporting materials referenced in our Revision Notice responses are located. This attachment is located at the end of our standalone Revision Notice response submission.
- We have included our Revision Notice responses to the eight Critical Issues in our Revised 2023-2025 WMP. We identify where they are found in the Revised 2023-2025 WMP in the Table of Contents. RN-PG&E-22-02 covers both Quality Assurance and Quality Control programs. Therefore, to maintain the sequencing of the 2023-2025 WMP Technical Guidelines, we have divided our response to RN-PG&E-22-02 between Sections 8.1.6.1, 8.1.6.2, 8.2.5.1, and 8.2.5.2 in our Revised 2023-2025 WMP.

We appreciate Energy Safety’s careful review of our 2023-2025 WMP. Please let us know if you need any additional materials or clarifications.

Sincerely

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Jay Leyno

Director, Wildfire Mitigation PMO

# 2023-2025 Wildfire Mitigation Plan Response to Revision Notice



**Pacific Gas and  
Electric Company**

Docket Title: 2023 to 2025 Electrical Corporation Wildfire Mitigation Plans  
Docket #: 2023-2025-WMPs

**August 7, 2023**

PACIFIC GAS AND ELECTRIC COMPANY  
2023 WILDFIRE MITIGATION PLAN  
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**Critical Issue RN-PG&E-23-01**

***Critical Issue Title:*** *Many of PG&E’s 3- and 10-year initiative objectives do not meet Energy Safety requirements as outlined in the Technical Guidelines.*

***Remedy #1:*** *PG&E must revise its 3- and 10-year objectives to address the specific issues that Energy Safety identifies above. PG&E may add, modify, and/or remove objectives, as needed, with the overall goal of strengthening its 3- and 10-year objectives so they are “specific, measurable, achievable, realistic, and timely.” PG&E may also add new or amend existing targets for any new or modified objectives.*

In the subsections below, PG&E provides all our objectives for each of the four 2023-2025 WMP sections, including those which have been revised and/or added in response to Energy Safety’s concerns. We also provide additional context for the modifications we have made to the objectives.

**Situational Awareness and Forecasting**

*Of PG&E’s four 3-year objectives, three are targeted for completion by the end of 2023 and, as such, do not sufficiently demonstrate a long-term plan for situational awareness and forecasting. The one remaining 3-year objective, with the application initiative tracking ID “SA-05,” is the only objective in this section with a completion date beyond 2023.*

Below are the Situational Awareness and Forecasting objectives that PG&E originally submitted in the 2023-2025 WMP.

**TABLE 8-21:  
SITUATIONAL AWARENESS INITIATIVE OBJECTIVES (3 YEAR PLAN)**

Objective Name	Objective Description	Applicable Initiative(s), Tracking ID(s)	Applicable Regulations, Codes, Standards, and Best Practices (See Note)	Method of Verification (i.e., Program)	Completion Date	Reference (Section and Page #)
Artificial Intelligence (AI) in Wildfire Cameras	Enable AI processing of Wildfire Camera Data to provide automated wildfire notifications in the internal PG&E monitoring tool (Wildfire Incident Viewer (WIV)).	SA-01	Early detection of new ignitions can help reduce the overall impact of the ignition through increased awareness and more rapid response.	Report from vendor outlining the deployment of the AI solution and incorporation of PG&E data feeds.  Successful user testing for notification push to WIV.	6/30/2023	Section 8.3.2.3 Page 583
EFD and DFA Reporting	Develop scalable processes to: (a) analyze alarms and alerts from Early Fault Detection (EFD) and Distribution Fault Anticipation (DFA) sensors; (b) conduct field investigation and reporting; (c) track identified mitigations to completion; and (d) track effectiveness of issue identification and remediation using EFD/DFA technologies.	SA-03	EFD and DFA are emerging technologies. Standards and best practices are to be developed as PG&E gains expertise operating these technologies	a) Specification document – Analysis Methodology for identified EFD/DFA Use Cases  b) Procedures detailing field processes for EFD/DFA field investigations  c) Report for EFD/DFA Investigation Results and Remediations	12/31/2023	Section 8.3.3.3 Page 590
FPI and IPW Modeling – Revision Evaluation	Evaluate enhancements to the Fire Potential Index (FPI) model and the Ignition Probability Weather (IPW) model. This involves testing new features and types of model configurations that could improve model skill. At present we do not know if model skills can be improved, but we will attempt to do so.	SA-04	Industry best practice across California (CA) utilities is to run and improve their own FPI.	Documentation that demonstrates evaluation of enhancements to the FPI model.	12/31/2023	Section 8.3.6.3 Page 620
Evaluate FPI and IPW Modeling enhancements in 2023-2025	Evaluate enhancements to the FPI model and the IPW model in the 2023-2025 period. This work involves testing new features and types of model configurations that could improve model forecasting ability. For example, one of the features that will be evaluated for inclusion in the IPW model is the use of covered conductor on the system.	SA-05	Industry best practice across California (CA) utilities is to run and improve their own FPI.	Documentation that demonstrates evaluation of enhancements to the FPI model.	12/31/2025	Section 8.3.6.3 Page 620

**TABLE 8-22:  
SITUATIONAL AWARENESS INITIATIVE OBJECTIVES (10-YEAR PLAN)**

Objective Name	Objective Description	Applicable Initiative(s), Tracking ID(s)	Applicable Regulations, Codes, Standards, and Best Practices (See Note)	Method of Verification (i.e., Program)	Completion Date	Reference (Section and Page #) <sup>(a)</sup>
Evaluate FPI and IPW Modeling enhancements in 2026-2032	Evaluate enhancements to the FPI (Fire Potential Index) model and the IPW (Ignition Probability Weather) model in the 2026-2033 period. This work involves testing new features and types of model configurations that could improve model forecasting ability.	SA-06	Industry best practice across California (CA) utilities is to run and improve their own FPI.	Documentation that demonstrates evaluation of enhancements to the FPI model.	12/31/2032	Section 8.3.6.3 Page 620

(a) Section and page references refer to PG&E's 2023-2025 WMP, R1.

To address Energy Safety’s Revision Notice, we updated our Situational Awareness and Forecasting Objectives in the following ways:

- SA-01 remains the same. PG&E met this objective in June 2023 through the application of artificial intelligence (AI) to enhance the wildfire camera network capabilities. By applying AI to our wildfire camera network, we can accelerate the detection and mitigation of wildfires and limit wildfire spread, including ignitions potentially involving our assets, thereby increasing the safety of our system. Through our vendor partnership, we implemented an AI system that can detect smoke imagery and alert our Hazard Awareness Warning Center (HAWC) of potential wildfires before they spread. The AI technology enhances our Hazard Analysis Tool (HAT) by integrating AI detection and alerting capabilities for wildfires by means of HAT alert popups. We successfully integrated the data flow process for all PG&E-sponsored cameras in the ALERTCalifornia camera network and into the HAT. We met all project deliverables and validated the completion of this work as is reflected in our second quarter reporting.

To respond to the Revision Notice, we created two additional objectives related to our AI work—SA-07, a three-year objective and SA-08, a 10-year objective—that demonstrate our long-term plan for situational awareness and forecasting work in this field. These two new objectives highlight how PG&E plans to continue to work with our AI vendor to improve and learn from the AI system and its capabilities over time. In furtherance of this long-term strategy, our AI vendor also works with CAL FIRE and other state and local agencies, and it is expected these agencies will also identify areas for improvement.

- SA-03, our objective relating to Early Fault Detection (EFD) and Distribution Fault Anticipation (DFA) reporting, remains the same. To address the finding in the Revision Notice, we created a new objective, SA-09, which expands our EFD/DFA analysis. During the WMP period, we will develop processes for analyzing and reporting on issue identification and remediation using EFD/DFA technologies. We will expand the program by evaluating new uses for this technology that could help identify emergency failure locations and inform asset inspection and maintenance work. PG&E also created new targets, SA-10 and SA-11, related to EFD/DFA installations.<sup>1</sup> See revised [Table 8-23](#) below.
- In our original 2023-2025 WMP filing, PG&E included three objectives related to evaluating the Fire Potential Index (FPI) and Ignition Probability Weather (IPW) models: SA-04, an objective ending in 2023; SA-05, a three-year objective; and SA-06, a 10-year objective. All three objectives focus on evaluating and enhancing the FPI and IPW models over different time horizons. SA-04 and SA-06 remain the same, while SA-05 was revised as part of the EPSS portion of this Revision Notice.
- Finally, we have also included a 10-year objective (SA-12) which encompasses our entire Situational Awareness portfolio. The objective outlines PG&E’s plans to evaluate and discuss our situational awareness tools internally, as well as with other

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<sup>1</sup> Section 3.1.1.1, Required Remedies, in the June 22, 2023 Revision Notice allows PG&E to add new or amend existing targets for any new or modified objectives.

IOUs. These evaluative discussions will include reviewing observations of our various situational awareness tools and identifying potential areas for improvement. We will also discuss best practices and lessons learned.

As a result of these changes, our updated list of Situational and Forecasting Objectives for the 2023-2025 WMP is now the following:



**TABLE 8-21 (REVISED):  
REVISED SITUATIONAL AWARENESS INITIATIVE OBJECTIVES (3-YEAR PLAN)**

Objective Name	Objective Description	Applicable Initiative(s), Tracking ID(s)	Applicable Regulations, Codes, Standards, and Best Practices (See Note)	Method of Verification (i.e., Program)	Completion Date	Reference (Section and Page #)
Artificial Intelligence (AI) in Wildfire Cameras	Enable AI processing of Wildfire Camera Data to provide automated wildfire notifications in the internal PG&E monitoring tool (Wildfire Incident Viewer – WIV).	SA-01	Early detection of new ignitions can help reduce the overall impact of the ignition through increased awareness and more rapid response.	Report from vendor outlining the deployment of the AI solution and incorporation of PG&E data feeds. Successful user testing for notification push to WIV.	6/30/2023	Section 8.3.2.3 Page 709
EFD and DFA Reporting	Develop scalable processes to: (a) analyze alarms and alerts from Early Fault Detection (EFD) and Distribution Fault Anticipation (DFA) sensors; (b) conduct field investigation and reporting; (c) track identified mitigations to completion; and (d) track effectiveness of issue identification and remediation using EFD/DFA technologies.	SA-03	EFD and DFA are emerging technologies. Standards and best practices are to be developed as PG&E gains expertise operating these technologies	a) Specification document – Analysis Methodology for identified EFD/DFA Use Cases b) Procedures detailing field processes for EFD/DFA field investigations c) Report for EFD/DFA Investigation Results and Remediations	12/31/2023	Section 8.3.3.3 Page 716
FPI and IPW Modeling – Revision Evaluation	Evaluate enhancements to the FPI (Fire Potential Index) model and the IPW (Ignition Probability Weather) model. This involves testing new features and types of model configurations that could improve model skill. At present we do not know if model skills can be improved but we will attempt to do so.	SA-04	Industry best practice across CA utilities is to run and improve their own FPI.	Documentation that demonstrates evaluation of enhancements to the FPI model.	12/31/2023	Section 8.3.6.3 Page 746

**TABLE 8-21 (REVISED):  
REVISED SITUATIONAL AWARENESS INITIATIVE OBJECTIVES (3-YEAR PLAN)  
(CONTINUED)**

Objective Name	Objective Description	Applicable Initiative(s), Tracking ID(s)	Applicable Regulations, Codes, Standards, and Best Practices (See Note)	Method of Verification (i.e., Program)	Completion Date	Reference (Section and Page #)
Evaluate FPI and IPW Modeling enhancements in 2023-2025 <sup>(a)</sup>	<p>Evaluate enhancements to the FPI (Fire Potential Index) model and the IPW (Ignition Probability Weather) model in 2023. This involves testing new features and types of model configurations that could improve model skill. For example, one of the features that will be evaluated for IPW is covered conductor and EPSS on the system. If covered conductor, EPSS, or other model enhancements, do not improve model skill, it will not be deployed as a part of the model improvement.</p> <p>At present we do not know if model skill can be improved but we will attempt to do so in 2023.</p> <p>If model skill can be improved and is approved, we plan to operationalize the new models in 2024 and continue operations in 2025. We do not know if any new models developed will be approved for operations by PG&amp;E's Wildfire risk governance committee.</p>	SA-05	Industry best practice across California (CA) utilities is to run and improve their own FPI.	Documentation that demonstrates evaluation of enhancements to the FPI and IPW model.	12/31/2025	Section 8.3.6.3 Page 746

**TABLE 8-21 (REVISED):  
REVISED SITUATIONAL AWARENESS INITIATIVE OBJECTIVES (3-YEAR PLAN)  
(CONTINUED)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., Program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)</b>
Monitor and evaluate the Cameras AI system's performance	In partnership with Digital Path (the AI vendor that works with us and other agencies on the broader camera network) monitor and evaluate the AI system's performance. Explore additional features and inputs to further enhance the system. At present we do not know what these enhancements will be specifically, however we will look for opportunities to explore best practices and incorporate enhancements with the vendor.	SA-07	Early detection of new ignitions can help reduce the overall impact of the ignition through increased awareness and more rapid response.	Documentation that demonstrates evaluation of enhancements to the Camera AI system.	12/31/2025	Section 8.3.2.3 Page 709
EFD and DFA Reporting	Perform a feasibility study on the use of EFD/DFA technologies to successfully identify incipient failures as a supplement to field inspections. If feasible, complete a data driven proposal for integrating sensor findings into the inspection program.	SA-09	EFD and DFA are emerging technologies. Standards and best practices are to be developed as PG&E gains expertise operating these technologies.	A feasibility proposal to the Wildfire Risk Governance Steering Committee (WRGSC) for integrating sensor findings into the inspection program.	12/31/2025	Section 8.3.3.1 Page 711

(a) In response to the Revision Notice, PG&E has modified SA-05 to include "EPSS" in the objective and method of verification descriptions. Details on this change are included in the [RN-PG&E-23-08](#) in section 9.2.1.

**TABLE 8-22 (REVISED):  
REVISED SITUATIONAL AWARENESS INITIATIVE OBJECTIVES (10-YEAR PLAN)**

Objective Name	Objective Description	Applicable Initiative(s), Tracking ID(s)	Applicable Regulations, Codes, Standards, and Best Practices (See Note)	Method of Verification (i.e., Program)	Completion Date	Reference (Section and Page #)
Evaluate FPI and IPW Modeling enhancements in 2026-2032	Evaluate enhancements to the FPI (Fire Potential Index) model and the IPW (Ignition Probability Weather) model in the 2026-2033 period. This work involves testing new features and types of model configurations that could improve model forecasting ability.	SA-06	Industry best practice across California (CA) utilities is to run and improve their own FPI.	Documentation that demonstrates evaluation of enhancements to the FPI model.	12/31/2032	Section 8.3.6.3 Page 746
Evaluate the Cameras AI system functionalities and technologies	In partnership with Digital Path and its collaboration with other camera sponsors, evaluate the AI system for opportunities to test new functionalities and newly developed break-through technologies. We will explore new best practices to ensure the ongoing effectiveness of the system.	SA-08	Early detection of new ignitions can help reduce the overall impact of the ignition through increased awareness and more rapid response.	Documentation that demonstrates evaluation of newly developed break-through technologies and new best practices to the Camera AI system.	12/31/2032	Section 8.3.2.3 Page 709
Evaluate the use and effectiveness of real-time monitoring tools	Each year, we will evaluate and discuss our situational awareness tools internally, as well as with other IOUs. These evaluative discussions will include reviewing observations of our various situational awareness tools and identifying potential areas for improvement. We will also discuss best practices and lessons learned. These discussions will help inform potential changes to what situational awareness tools we incorporate, as well as how they are incorporated. This may include equipment upgrades, new tech integrations, model improvements, and enhanced data initiatives.	SA-12	For emerging technologies, standards and best practices are to be developed as PG&E gains expertise operating these technologies. Early detection of new ignitions can help reduce the overall impact of the ignition through increased awareness and more rapid response.	An annual feasibility proposal to the Wildfire Risk Governance Steering Committee (WRGSC) for integration discussion.	12/31/2032	Section 8.3.2.3 Page 709

As noted above, we have also added two new Situational Awareness targets in connection with the modifications to existing objective SA-09. Revised [Table 8-23](#) below lists the new Situational Awareness and Forecasting Targets, SA-10 and SA-11. The new targets describe the installation of additional EFD and DFA from 2023-2025. These targets contribute to our long-term situational awareness goals. Original target SA-02 is also included to reflect the complete table.

**TABLE 8-23 (REVISED):  
REVISED SITUATIONAL AWARENESS INITIATIVE TARGETS BY YEAR**

Target Name	Initiative Activity Tracking ID	Reference Section	2023 Target & Unit	x% Risk Impact 2023	2024 Target & Unit	x% Risk Impact 2024	2025 Target & Unit	x% Risk Impact 2025	Method of Verification
Line Sensor – Installations	SA-02	8.3.3.1	Install Line Sensor devices on 40 circuits.	8% (Eyes-on-Risk)	Install Line Sensor devices on 40 circuits.	TBD	Install Line Sensor devices on 40 circuits.	TBD	Completed job packages
Distribution Fault Anticipation (DFA) Installations	SA-10	8.3.3.3	Install 5 Distribution Fault Anticipation (DFA) sensors on circuits(a). One sensor will be installed per circuit at the initiating substation.	< 1% (Eyes-on-Risk)	Install 15 Distribution Fault Anticipation (DFA) sensors on circuits. One sensor will be installed per circuit at the initiating substation.	5.1% (Eyes-on-Risk)	Install 15 Distribution Fault Anticipation (DFA) sensors on circuits. One sensor will be installed per circuit at the initiating substation.	5.1% (Eyes-on-Risk)	Report demonstrating the first communication between the sensor and the Headend software.
Early Fault Detection (EFD) Installations	SA-11	8.3.3.3	Install Early Fault Detection (EFD) sensors on 2 circuits(b).	< 1% (Eyes-on-Risk)	Install Early Fault Detection (EFD) sensors on 2 circuits.	< 1% (Eyes-on-Risk)	Install Early Fault Detection (EFD) sensors on 4 circuits.	2.8% (Eyes-on-Risk)	SAP report with notification completion date, circuit name, and location.

(a) A total of 5 DFA sensors were installed in 2023 from 2022 carry-over workplans. These installs were not counted or credited toward work in 2022.

(b) A total of 2 circuits were instrumented with EFD sensors in 2023 from 2022 carry-over workplans. These installs were not counted or credited toward work in 2022.

## **Emergency Preparedness**

*PG&E lists three 3-year objectives and two 10-year objectives in this section. The 10-year objectives are the same as two of the 3-year objectives and do not sufficiently demonstrate a long-term plan for emergency preparedness.*

PG&E's Emergency Preparedness and Response (EP&R) organization is responsible for emergency preparedness, prevention, response, mitigation, and recovery in responding to wildfire and PSPS emergency incidents. EP&R's strategy focuses on initiatives that ensure we remain prepared to respond to these events in ways that benefit our customers and communities. As part of PG&E's wildfire and PSPS emergency preparedness efforts, EP&R annually publishes the Company Emergency Response Plan (CERP), in Appendix E, that provides guidance on managing emergencies and establishes processes that are scalable to any hazard, including Wildfire and PSPS events.<sup>2</sup>

Below are tables showing the Emergency Preparedness objectives that PG&E originally submitted in the 2023-2025 WMP.

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<sup>2</sup> 2023-2025 WMP, page 620.

**TABLE 8-33:  
EMERGENCY PREPAREDNESS INITIATIVE OBJECTIVES (3-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)<sup>(a)</sup></b>
Complete PSPS and Wildfire Tabletop and Functional Exercises	Complete PSPS and Wildfire Tabletop and Functional Exercise annually in compliance with the guiding principles of the Homeland Security Exercise Evaluation Program (HSEEP)	EP-01	PSPS exercise requirements: Phase 1: Decision (D.) 19-05-042 PSPS OII: D.21-06-014 PSPS Phase 2 D.20-05-051 PSPS Phase 3 D.21-06-034 Wildfire exercise: 1) Rulemaking (R.) 18-12-005 Appendix A (b) De-energization Exercises	Check-in/check-out records or After-Action Review (AAR) items	12/31/2025	Section 8.4.2.3.1 Page 667
Maintain all hazards planning and preparedness program in 2023-2025	Maintain the All Hazards Planning and Preparedness Program to provide emergency response and safely and expeditiously restore service.	EP-02	GO 166 Standard 1 and Standard 1.J ISO 45001 and 14001	Check-in/check-out records or After-Action Review (AAR) items	12/31/2025	Section 8.4.3.1 Page 683
Expand all hazards planning to include additional threats and scenarios in 2023-2025	Expand the all hazards planning program to include additional threats and scenarios.	EP-04	GO 166 in its entirety	Check-in/check-out records or After-Action Review (AAR) items	12/31/2025	Section 8.4.3.1 Page 683
<p>(a) Section and page references refer to PG&amp;E's 2023-2025 WMP, R1.</p>						



**TABLE 8-34:  
EMERGENCY PREPAREDNESS INITIATIVE OBJECTIVES (10-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)<sup>(a)</sup></b>
Maintain all hazards planning and preparedness program in 2026-2032	Maintain the all hazards planning and preparedness program to provide emergency response and safely and expeditiously restore service.	EP-03	GO 166 Standard 1 and Standard 1.J ISO 45001 and 14001	Check-in/check-out records or After-Action Review (AAR) items	12/31/2032	Section 8.4.3.1 Page 683
Expand all hazards planning to include additional threats and scenarios in 2026-2032	Expand the all hazards planning program to include additional threats and scenarios.	EP-05	GO 166 in its entirety	Check-in/check-out records or After-Action Review (AAR) items	12/31/2032	Section 8.4.3.1 Page 683

(a) Section and page references refer to PG&E's 2023-2025 WMP, R1.

To address Energy Safety's Revision Notice, we have updated our Emergency Preparedness Objectives as follows:

- EP-01 describing our PSPS and Wildfire Tabletop and Functional Exercise has not changed.
- EP-02 and EP-04 relating to the All-Hazards Planning and Preparedness Program remain the same.
- EP-03: We replaced our existing 10-year objective related to maintaining our all hazards planning and preparedness program (EP-03) with a new 10-year objective (EP-07) that sets forth our long-term plan for emergency preparedness.

The new integrated operating data will support our emergency response efforts in a single common operating picture tool. In 2028, PG&E will develop a common operating picture technology to better create situational awareness of ongoing emergencies or hazards, including the availability of necessary resources. The FEMA National Response Framework (NRF) defines a common operating picture (COP) as a continuously updated overview of an incident compiled throughout an incident's life cycle from data shared between integrated systems for communication, information management, and intelligence and information sharing. In short, a COP achieves real-time situational awareness across all levels of incident management and jurisdictions for any given emergency incidents. A COP can provide emergency operations centers, incident commanders, and response personnel accurate and timely information concerning equipment distribution, location of personnel, on-site intelligence, and incident mapping when responding to and managing an incident. The National Incident Management System (NIMS) and NRF suggest that agencies develop a COP for responding to a large-scale incident or an incident involving multiple agencies. Specifically, the NRF states that local governments should "gain and maintain situational awareness" in their response actions during a crisis event. Developing a COP system which incorporates advanced technology such as mapping tools, sensors, and video feeds, can improve incident response by dramatically enhancing information sharing, situational awareness, and data transfer during emergency incidents."<sup>3</sup>

- EP-05: We replaced our existing 10-year objective related to expanding our all hazards planning to include additional threats and scenarios with a new 10-year objective (EP-08). Between 2023 and 2032, PG&E will execute a Threats and Hazard Identification and Risk Assessment (THIRA) update every three years to address changes in hazard landscape, update the CERP and existing eight hazard annexes, and develop any new annexes as applicable.

The THIRA is a FEMA program developed for public sector agencies. It is a three-step risk assessment process that narrowly defines a threat or hazard based on likelihood of occurrence and impact on an organization's ability to deliver on specified core capabilities. Through identifying core capability targets, an organization can uncover what its current core capabilities are, determine if there

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<sup>3</sup> [https://www.dhs.gov/sites/default/files/publications/CommonOpER\\_HLT\\_0908-508.pdf](https://www.dhs.gov/sites/default/files/publications/CommonOpER_HLT_0908-508.pdf).

are any gaps, and develop plans to close those gaps. The THIRA's emergency management focused perspective helps to inform if hazard annexes should be improved, modified, or added.<sup>4</sup>

- EP-09: PG&E is also adding a new 10-year objective. Between 2023 and 2032, PG&E will execute briefings with 47 counties within PG&E's service territory every three years to support integrated planning discussions.

As a result of these changes, below are tables showing the updated Emergency Preparedness Objectives for the 2023-2025 WMP.

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<sup>4</sup> [National Risk and Capability Assessment | FEMA.gov](https://www.fema.gov/national-risk-and-capability-assessment).

**TABLE 8-33 (REVISED):  
REVISED EMERGENCY PREPAREDNESS INITIATIVE OBJECTIVES (3-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)<sup>(a)</sup></b>
Complete PSPS and Wildfire Tabletop and Functional Exercises	Complete PSPS and Wildfire Tabletop and Functional Exercise annually in compliance with the guiding principles of the Homeland Security Exercise Evaluation Program (HSEEP)	EP-01	PSPS exercise requirements: <ul style="list-style-type: none"> <li>• Phase 1: 19-05-042</li> <li>• PSPS OII: 21-06-014</li> <li>• PSPS Phase 2 Decision 20-05-051</li> <li>• PSPS Phase 3 Decision 21-06-034</li> </ul> Wildfire exercise: 1) Rulemaking 18-12-005 Appendix A(b) De-energization Exercises	Check-in/check-out records or After Action Review (AAR) items	11/30/2023 11/30/2024 11/30/2025	Section 8.4.2.3.1 Page 794
Maintain All Hazards Planning and Preparedness Program	Maintain the All Hazards planning and preparedness program to provide emergency response and safely and expeditiously restore service.	EP-02	GO 166 Standard 1 and Standard 1.J ISO 45001 and 14001	Check-in/check-out records or After-Action Review (AAR) items	12/31/2025	Section 8.4.3.1 Page 810
Expand all hazards planning to include additional threats and scenarios	Expand the All Hazards planning program to include additional threats and scenarios.	EP-04	GO 166 in entirety	Check-in/check-out records or After-Action Review (AAR) items.	12/31/2025	Section 8.4.3.1 Page 810
_____ (a) Section and page references refer to PG&E's 2023-2025 WMP, R2.						

**TABLE 8-34 (REVISED):  
REVISED EMERGENCY PREPAREDNESS INITIATIVE OBJECTIVES (10-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)</b>
Common Operating Picture Technology	Design and deploy a common operating picture <sup>(a)</sup>	EP-07	N/A	1. Common Operating Picture tool 2. Guidance Document that defines the use of common operating picture	12/31/2028	Section 8.4.3.1 Page 810
Threats and Hazards Identification and Risk Assessment (THIRA) updates	Execute a Threats and Hazards Identification and Risk Assessment (THIRA) <sup>(b)</sup> update every three years to address changes in the hazard landscape. Use information from THIRA to inform changes to the CERP and hazard annexes.	EP-08	GO 166	Published Company Emergency Response Plan (CERP) and Annexes	12/31/2023 12/31/2026 12/31/2029 12/31/2032	Section 8.4.3.1 Page 810
County Execute Briefings	Hold briefings with 47 counties within PG&E's service territory after every THIRA update to support integrated planning discussions.	EP-09	Best Practice	Documentation of meeting materials, and records of attendance.	12/31/2032	Section 8.4.3.1 Page 810

(a) A common operation picture (COP) is a continuously updated overview of an incident compiled throughout an incident's life cycle from data shared between integrated communication, information management, and intelligence and information sharing systems. The goal of a COP is real-time situational awareness across all levels of incident management and across jurisdictions.

<https://www.dhs.gov/publication/common-operating-picture-emergency-responders>.

(b) According to FEMA

<https://www.fema.gov/emergency-managers/national-preparedness/goal/risk-capability-assessment#:~:text=The%20Threat%20and%20Hazard%20Identification,hazards%20can%20affect%20our%20community%3F>. The THIRA is a three-step risk assessment process that helps communities understand their risks and what they need to do to address those risks.

## **Community Outreach and Engagement**

*PG&E provides one 3-year objective and one 10-year objective in this section. The objectives for both are the same and do not sufficiently demonstrate a long-term plan for community outreach and engagement. PG&E's one objective for this section is to "hold community engagement meetings"; however, there are no specific number of meetings or frequency of meetings listed within the objectives, and PG&E included no other measurable objectives within the section.*

Below are tables showing the Community Outreach and Engagement Objectives that PG&E originally submitted in the 2023-2025 WMP.

**TABLE 8-53:  
COMMUNITY OUTREACH AND ENGAGEMENT INITIATIVE OBJECTIVES (3-YEAR PLAN)**

Objective Name	Objective Description	Applicable Initiative(s), Tracking ID(s)	Applicable Regulations, Codes, Standards, and Best Practices	Method of Verification (i.e., Program)	Completion Date	Reference (Section and Page #) <sup>(a)</sup>
Community Engagement – Meetings	Hold community engagement meetings within the five PG&E regions of service that will include, but are not limited to, a mix of webinars, open houses, town halls, and/or answer centers.	CO-01	Continued from 2022 WMP – Investigation 19-06-015: 2017 North Bay Fires/ 2018 Camp Fire OII	For In-Person Meetings: Third-party prepared meeting summary  For Virtual Meetings: Link to recording of session	9/30/2023 9/30/2024 9/30/2025	Section 8.5.2  Page 729
<hr/> (a) Section and page references refer to PG&E’s 2023-2025 WMP, R1.						

**TABLE PG&E-8-54:  
COMMUNITY OUTREACH AND ENGAGEMENT INITIATIVE OBJECTIVES (10-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices</b>	<b>Method of Verification (i.e., Program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)<sup>(a)</sup></b>
Community Engagement – Meetings in 2026-2032	Continue to hold community engagement meetings within the five PG&E regions of service. This work will include, but not be limited to, a mix of webinars, open houses, town halls, and/or answer centers.	CO-03	Ongoing lessons learned from the WMP and proceedings pertaining to stakeholder engagement and wildfire safety	For In-Person Meetings: Third-party prepared meeting summary  For Virtual Meetings: Link to recording of session	12/31/2032	Section 8.5.2 Page 729
<hr/> (a) Section and page references refer to PG&E's 2023-2025 WMP, R1.						



To address Energy Safety's concerns, PG&E has updated both objectives to demonstrate that our long-term plan includes measurable objectives and provides information on meeting frequency. We have also added two new 10-year objectives to demonstrate additional community and customer outreach and engagement plans. More specifically:

- CO-01: We revised our existing 3-year objective related to Community Engagement Meetings to quantify the number of events and provide information on meeting frequency. From 2023 to 2025, PG&E will hold 22 community engagement meetings each year within the five regions of service that may include a mix of webinars, open houses, town halls, and/or answer centers. All customers in HFRA areas are invited to specific multi-county and regional-level presentations corresponding to their location. These will be held annually from January 1 through September 30. For in-person meetings, we will prepare a meeting summary which includes number of attendees, date, location, and topics covered. For virtual meetings, the sessions are recorded and a link to the meeting recording is posted to our website at [pge.com/webinars](http://pge.com/webinars).
- CO-03: We are removing objective CO-03 because it is a continuation of the three-year objective, CO-01. Based on attendance and engagement over the next three years, and to address any significant programmatic changes with the Community Wildfire Safety Program, PG&E plans to continue holding approximately the same number of community engagement meetings within the five PG&E regions of service. The number and frequency of community engagement meetings may be adjusted based on attendance, engagement, feedback from customers and local agencies, and to communicate significant programmatic changes to PG&E's various wildfire mitigation programs.
- CO-04: We have added a new objective related to non-residential, customer outreach. PG&E will perform outreach via email, phone, in-person meeting, and/or virtual meeting to assigned Critical Infrastructure customers in the HFRA through Business Energy Solutions (assigned account managers). Outreach will cover the CWSP, including potential PSPS and EPSS impacts, and updating contact information for critical accounts in the HFRA.

This outreach will be performed annually throughout the 10-year objective timeframe. The target audience for this outreach is Critical Customers in the PSPS "Could be Affected" or EPSS program zones who have an assigned PG&E account manager. Critical Customers include all Level 1-Public Safety Partners and Level 2-High Impact Critical Customers as defined by the CPUC.

- CO-05: We have added a new objective related to residential customer outreach. PG&E will conduct at least one direct-to-customer outage preparedness campaign annually via email and/or direct mail targeting residential customers in the PSPS more likely or EPSS program scope.

This outreach will be performed annually throughout the 10-year objective timeframe. The target audience for this outreach is residential customers in the PSPS "Could be Affected" or EPSS program zones.

In addition to the objectives above, community and regional webinars and in-person events will be used to share important CWSP updates, progress, program forecasts and to hear feedback from customers and community stakeholders. Those direct communications will continue to be supplemented by information on the pge.com website related to CWSP program developments and customer support offerings.

Below is our final list of Community Engagement Objectives, as revised pursuant to this Revision Notice.

**TABLE 8-53 (REVISED):  
REVISED COMMUNITY OUTREACH AND ENGAGEMENT INITIATIVE OBJECTIVES (3-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices</b>	<b>Method of Verification (i.e., Program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)</b>
Community Engagement – Meetings	For 2023-2025, PG&E will hold annually a total of 22 community engagement meetings within the five regions of service that will include, but are not limited to, a mix of webinars, open houses, town halls, and/or answer centers.	CO-01	Continued from 2022 WMP – I.19-06-015: 2017 North Bay Fires / 2018 Camp Fire Oil	1) Meeting summary for In-Person meetings 2) Recording of session for Virtual meetings	9/30/2023 9/30/2024 9/30/2025	Section 8.5.2 Page 857

**TABLE PG&E-8-54 (REVISED):  
REVISED COMMUNITY OUTREACH AND ENGAGEMENT INITIATIVE OBJECTIVES (10-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices</b>	<b>Method of Verification (i.e., Program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)</b>
Community Engagement - Outreach to HFRA Infrastructure Customers	PG&E will perform outreach via email and/or phone to assigned Critical Infrastructure customers in the HFRA through Business Energy Solutions (assigned account managers). Outreach will cover the CWSP, including potential PSPS and EPSS impacts, and updating contact information for critical accounts in the HFRA.	CO-04	Ongoing lessons learned from the WMP and proceedings pertaining to stakeholder engagement and wildfire safety.	1) Report of assignments and completed tasks 2) List of critical infrastructure customers	12/31/ 2032	Section 8.5.2 Page 857
Community Engagement - Outage Preparedness Campaign	PG&E will also conduct at least one direct-to-customer outage preparedness campaign annually via email and/or direct mail targeting residential customers in the PSPS more likely or EPSS program scope.	CO-05	Ongoing lessons learned from the WMP and proceedings pertaining to stakeholder engagement and wildfire safety.	1) Letter content (sample letter) 2) Customer lists for distribution	12/31/2032	Section 8.5.2 Page 857

### **Public Safety Power Shutoff (PSPS)**

*PG&E provides two 3-year objectives and three 10-year objectives in this section. Two of the 10-year objectives are the same as the 3-year objectives and do not sufficiently demonstrate a long-term plan for reducing PSPS. PG&E's PSPS objectives fail to demonstrate its commitment to reducing PSPS scale, scope, and frequency.*

Below are tables showing the PSPS Objectives that PG&E originally submitted in the 2023-2025 WMP.

**TABLE PG&E-9-3:  
PSPS INITIATIVE OBJECTIVES (3-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)<sup>(a)</sup></b>
Evaluate enhancements for the PSPS Transmission guidance	Evaluate enhancements for the PSPS Transmission guidance to enhance focus of PSPS events.	PS-01	Industry best practice across California utilities is to run and improve their own models.	Documentation on evaluation of update to PSPS guidance	12/31/2025	Section 9.2.1 Page 766
Evaluate incorporation of approved IPW enhancements into the PSPS Distribution guidance	Evaluate incorporation of approved IPW enhancements into the PSPS Distribution guidance to enhance focus of PSPS events.	PS-02	D.19-05-042 and OIR 18-12-005 and Revision Notice 22-12 from 2022 WMP, Industry best practice across California utilities is to run and improve their own models.	Documentation on evaluation of update to PSPS guidance	12/31/2025	Section 9.2.1 Page 766
<hr/> <p>(a) Section and page references refer to PG&amp;E's 2023-2025 WMP, R1.</p>						

**TABLE PG&E 9-4:  
PSPS INITIATIVE OBJECTIVES (10-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)<sup>(a)</sup></b>
Evaluate enhancements for the PSPS Transmission guidance	Evaluate enhancements for the PSPS Transmission guidance to enhance focus of PSPS events.	PS-03	Industry best practice across California utilities is to run and improve their own models.	Documentation on evaluation of update to PSPS guidance	12/31/2032	Section 9.2.1 Page 771
Evaluate incorporation of approved IPW enhancements into the PSPS Distribution guidance	Evaluate incorporation of approved IPW enhancements into the PSPS Distribution guidance to enhance focus of PSPS events.	PS-04	D.19-05-042 and OIR 18-12-005 and Revision Notice 22-12 from 2022 WMP, Industry best practice across California utilities is to run and improve their own models.	Documentation on evaluation of update to PSPS guidance	12/31/2032	Section 9.2.1 Page 771
Evaluate the transition of the Portable Battery Program to permanent battery solutions	Evaluate the transition of the Portable Battery Program to permanent battery solutions for PG&E customers at risk of PSPS or EPSS, focusing on but not limited to AFN, MBL, and self-identified vulnerable populations.	PS-05	CPUC R.12-11-005, D.19-09-027, CPUC R.12-11-005, D.20-01-021	Documentation of the assessment for transitioning to permanent battery solutions	12/31/2032	Section 8.5.3 Page 742

(a) Section and page references refer to PG&E's 2023-2025 WMP, R1.

To address Energy Safety's Revision Notice items, we have updated our PSPS Objectives in the following ways:

- PS-01, PS-02, and PS-05 remain the same.
- PS-03 and PS-04 (10-year objectives) were removed due to them being duplicative of PS-01 and PS-02 (3-year objectives). PG&E will instead add two new 10-year objectives to further demonstrate a long-term plan for reducing PSPS.
- PS-08: PG&E is adding a new 10-year objective (PS-08). This objective is related to evaluating emerging technologies. PG&E will evaluate emerging technologies for transmission and distribution that may further reduce scale, scope, or frequency of PSPS. PS-08 replaces PS-03.

PG&E is continuously evaluating emerging technologies that can potentially reduce the impacts of PSPS as technologies can evolve year over year. For example, advanced protection and monitoring technologies such as downed conductor detection (DCD) devices, EPSS, drones, partial voltage, and Gridware.

- PS-09: PG&E is adding a new 10-year objective (PS-09). This objective is related to evaluating PSPS reduction through undergrounding. PG&E will look to reduce PSPS scale and scope over the ten years through our 10,000-mile undergrounding program. PS-09 replaces PS-04.

As part of a multiyear effort, PG&E's undergrounding program is expected to reduce the scale, scope, and/or frequency of PSPS. PG&E is planning to underground 2,100 miles in 2023-2026 and will continue to pursue more undergrounding as part of this program.<sup>5</sup> PG&E will use a back cast analysis to demonstrate the PSPS benefit associated with undergrounding work completed.

- PS-10: PG&E is adding a new 3-year objective (PS-10). This objective is related to PSPS lessons learned. We will continue sharing PSPS lessons learned and best practices with CA IOUs through monthly meetings focused on PSPS.

PG&E currently holds monthly meetings with California IOUs to share lessons learned and best practices related to PSPS. In addition to discussing lessons learned from PSPS events, other topics of discussion include improving customer and community notifications, evaluating tools and technology to support safety outage decision-making, and assessing safety power outage criteria. Following each monthly meeting, the IOUs submits a joint report to the CPUC within 14 days highlighting each topic of discussion.

- PS-11: PG&E is adding a new 3-year objective (PS-11). This objective is related to evaluating whether drones can be used to support PSPS restoration efforts. PG&E will pilot the use of drones for PSPS restoration and/or damage assessment to improve PSPS outage restoration time.

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<sup>5</sup> 2023-2025 WMP, R1, p. 347.



In 2023, PG&E used drones for distribution aerial inspection to help identify abnormal conditions on distribution overhead assets in HFTD and HFRA. In 2024, PG&E will pilot the use of drones to assist in PSPS patrol and damage assessment. PG&E will use the pilot program to determine whether this will improve faster PSPS restoration time.

As a result of these changes, our updated list of PSPS Objectives for the 2023-2025 WMP is now the following:

**TABLE PG&E-9-3 (REVISED):  
REVISED PSPS INITIATIVE OBJECTIVES (3-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)</b>
Evaluate enhancements for the PSPS Transmission guidance	Evaluate enhancements for the PSPS Transmission guidance to enhance focus of PSPS events.	PS-01	Industry best practice across California (CA) utilities is to run and improve their own models.	Documentation on evaluation of update to PSPS guidance	12/31/2025	Section 9.2.1 Page 894
Evaluate incorporation of approved IPW enhancements into the PSPS Distribution guidance	Evaluate incorporation of approved IPW enhancements into the PSPS Distribution guidance to enhance focus of PSPS events.	PS-02	2022 WMP, Industry best practice across California (CA) utilities is to run and improve their own models.	Documentation on evaluation of update to PSPS guidance	12/31/2025	Section 9.2.1 Page 894
Continue sharing PSPS lessons learned	Continue sharing PSPS lessons learned and best practices with CA IOUs through monthly meetings focused on PSPS.	PS-10	Industry best practice across California utilities is to run and improve their own models. I.19-06-015 (Wildfire OII Settlement) D.20-06-017 (PSPS OII) D.21-06-014 (PSPS OII)	Monthly meeting notes submitted to CPUC by utility hosting joint IOU meeting	12/31/2025	Section 9.1.2 Page 881
Pilot using drones for PSPS restoration	Pilot using drones for PSPS restoration and/or damage assessment to improve PSPS outage restoration time.	PS-11	All flight operations will be conducted under FAA Part 107 and Part 91 rules.	Documentation presented to the Wildfire Risk Governance Steering Committee (WRGSC) to show results of the pilot program effectiveness.	12/31/2024	Section 9.1.2 Page 881

**TABLE PG&E-9-4 (REVISED):  
REVISED PSPS INITIATIVE OBJECTIVES (10-YEAR PLAN)**

<b>Objective Name</b>	<b>Objective Description</b>	<b>Applicable Initiative(s), Tracking ID(s)</b>	<b>Applicable Regulations, Codes, Standards, and Best Practices (See Note)</b>	<b>Method of Verification (i.e., program)</b>	<b>Completion Date</b>	<b>Reference (Section and Page #)</b>
Evaluate the transition of the Portable Battery Program to permanent battery solutions	Evaluate the transition of the Portable Battery Program to permanent battery solutions for PG&E customers at risk of PSPS or EPSS, focusing on but not limited to AFN, MBL, and self identified vulnerable populations.	PS-05	CPUC R.12-11-005, D.19-09-027, CPUC R.12-11-005, D.20-01-021	Documentation of the assessment for transitioning to permanent battery solutions	12/31/2032	Section 8.5.3 Page 865
Evaluate emerging technologies to reduce PSPS customer impact	Evaluate emerging technologies for transmission and distribution that may further reduce scale, scope, or frequency of PSPS.	PS-08	N/A	Documentation of recommendations made to the Wildfire Risk Governance Steering Committee (WRGSC).	12/31/2032	Section 9.1.2 Page 879
Reduce PSPS impacts via Undergrounding	Reduce PSPS size, duration, or frequency over the next ten years as part of our 10,000-mile undergrounding program.	PS-09	N/A	Using the static 5 years (2018-2022) back cast analysis under the 2022 PSPS protocols, generate a report of the impact of undergrounding to reducing size, duration, or frequency of PSPS.	12/31/2032	Section 9.1.2 Page 879

## Critical Issue RN-PG&E-23-02

**Critical Issue Title:** *PG&E does not provide sample sizes and target pass rates for certain asset and vegetation management quality assurance and control programs as required by the Technical Guidelines.*

**Remedy # 1:** *PG&E must define yearly target pass rates for 2023 through 2025 for its asset management and inspections QA and QC programs in Tables 8-7-1 and 8-7-2, without adding in any qualifiers such as “Critical Pass Rates.” In accordance with PG&E-22-21, the target pass rate for asset QA and QC programs must be no less than 95 percent for 2023 and 2024; however, if PG&E believes this target is infeasible for any of its programs, it must provide a plan to achieve a 95 percent pass rate for 2025, including progressively increasing pass rate targets for 2023 and 2024.*

### Response to Critical Issue RN-PG&E-23-02, Remedy # 1

Please see the [Revised Table 8-7-1](#) below, which includes yearly target pass rates for our asset management and inspections QA program for 2023 through 2025.<sup>6</sup> The tables below demonstrate how PG&E will continuously improve each year, while simultaneously and systematically increasing the target pass rates each year.

Over the last two years, PG&E has realized quality improvements in QA by implementing standardized training, work instructions and performance of quality management system. PG&E anticipates that robust reporting, trend analysis, opportunity sharing among internal stakeholder groups, and subsequent targeted actions over the 2023-2025 time period will help us reach our goal of achieving a 95% pass rate by 2025.

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<sup>6</sup> In this response, PG&E adopts Energy Safety’s terminology by using the term “pass rate” without any qualifiers. However, PG&E’s definition of “pass rate” for QA and QC activities is the same as the definition of “Critical Pass Rate” defined in response to Energy Safety Data Request 2-7. PG&E defines “pass rate” as “the number of assets reviewed by QC that do not have a Critical Attribute (as defined by Asset Strategy) failure or miss divided by the number of assets reviewed by QC.” PG&E does not have another definition of “pass rate” that it uses for the QA or QC programs outside of the WMP.

**TABLE 8-7-1 (REVISED):  
REVISED GRID DESIGN AND MAINTENANCE SYSTEM INSPECTION QA PROGRAM**

<b>Inspection Type</b>	<b>Minimum Sample Size 2023-25 (locations)</b>	<b>Type of Audit</b>	<b>Audit Results 2022 as of 12/1/22</b>	<b>Yearly Target Pass Rate for 2023-2025</b>
Transmission	500	Field	N/A. This work was not performed in 2022.	2023: 90% 2024: 92% 2025: 95%
Distribution	1500	Field	N/A. This work was not performed in 2022.	2023: 80% 2024: 88% 2025: 95%

PG&E has not revised Table 8-7-2 to provide minimum QC sample sizes and pass rates for 2023 to 2025. PG&E is currently working to integrate QC with our execution processes to drive quality during initial work execution. This approach will create real-time learnings to coach and guide workers through the work execution process so that work is completed correctly the first time.

Creating WMP QC targets—including larger sample sizes and minimum pass rate targets through 2025—would hinder PG&E’s flexibility to reallocate limited quality resources to improve overall work execution and performance. PG&E needs the ability to update the QC program in the future based on learnings from the Quality Management System, which includes both QA and QC functions.

While PG&E has not set QC targets, the program is an important tool to help us improve our performance. The system inspections and QC organizations have weekly collaboration sessions, from the supervisor to the senior director level, to (1) solution improvement opportunities, (2) identify gaps in the process, (3) address challenges, (4) perform root cause analysis, and (5) review trends. As of July 10th, we have created 74 additional PG&E compliance inspector positions across our service territory, as well as 6 supervisor positions to oversee the added headcount.

As a result of this collaboration, our system inspection performance has significantly improved in 2023, as shown in [Table RN-PG&E-23-02-1](#) below. We anticipate that this improvement trend will continue going forward as we adjust our QC processes in response to real-time, field observations.

**TABLE RN-PG&E-23-02-1:  
GRID DESIGN AND MAINTENANCE SYSTEM INSPECTION QC PROGRAM PERFORMANCE**

<b>Inspection Type</b>	<b>Type of Audit</b>	<b>2022 Pass Rate Results</b>	<b>2023 YTD Pass Rate Results (Data as of 7/25/2023)</b>
Transmission	Field	80.9%	98.4%
	Desktop	92.1%	98.7%
Distribution	Field	79.3%	87%
	Desktop	85.5%	94.0%

**Remedy # 2:** PG&E must provide sample sizes for the 2023-2025 WMP cycle for its vegetation management QV and QC programs in Tables 8-18-1 and 8-18-2.

**Response to Critical Issue RN-PG&E-23-02, Remedy # 2**

Please see our [Revised Table 8-18-1](#) below, which provides sample sizes and yearly target pass rates for our vegetation management QA Performance (formerly QV) program for 2023 to 2025. Units represent unique audit locations. Sample sizes were informed by projected work plans and statistical modeling.

As demonstrated below, PG&E has a plan to increase our target pass rates each year. To operationally address quality, PG&E is working to create an internal inspection workforce through an agreement with the IBEW. This agreement incentivizes career progression and certification, which bolsters a more stable workforce. PG&E has a training path for inspectors that includes a sign-off from a Mentor or Leader.

PG&E continues to work with California Community Colleges to implement a two-week Utility Vegetation Manage Level One Pre-Inspector course which includes classroom and in field instruction. The curriculum includes how to examine circuits for hazard trees, accurate tree identification, encroachment, potential encroachment, and evaluating clearances. As of Q1 2023, 5 colleges were delivering the training and 5 were in planning.

PG&E has also implemented additional operational efforts to address quality on vegetation management programs. The VM and QVVM organizations have set up weekly collaboration sessions, from the supervisor to the director level, to identify improvement opportunities, gaps in the process, address challenges, conduct root cause analyses, and review trends. The information is then used to inform improvement opportunities. As part of the 2023 improvement effort, VM has worked with the tree crews and VMI teams to do additional oversight prior to completion of work. There is direct feedback to the vendors on their performance reviewing areas for improvement.

**TABLE 8-18-1 (REVISED):  
REVISED VEGETATION MANAGEMENT QA PERFORMANCE (FORMERLY QV) PROGRAM**

<b>Inspection Program</b>	<b>2022 Sample Size<sup>(a)</sup></b>	<b>Type of Audit</b>	<b>Audit Results 2022<sup>(c)</sup></b>	<b>2023-2025 Minimum Sample Size (locations)<sup>(d)</sup></b>	<b>Yearly Target Pass Rate</b>
Distribution	28,516 Locations	Field	91.3% <sup>(b)</sup>	N/A	2023: N/A 2024: N/A 2025: N/A
Distribution VM -HFTD	N/A	Field	N/A	2023: 2,500 2024: 2,675 2025: 2,862	2023: 95% 2024: 95% 2025: 95%
Distribution VM – Non-HFTD	N/A	Field	N/A	N/A	2023: N/A 2024: N/A 2025: N/A
Transmission	5,896 Locations	Field	94.2%	N/A	2023: N/A 2024: N/A 2025: N/A
Transmission VM – HFTD	N/A	Field	N/A	2023: 1,200 2024: 1,284 2025: 1,374	2023: 95% 2024: 95% 2025: 95%
Transmission VM – Non-HFTD	N/A	Field	N/A	N/A	2023: N/A 2024: N/A 2025: N/A
Vegetation Control Pole Clearing	3,469 Poles	Field	90.3%	N/A	2023: N/A 2024: N/A 2025: N/A
Vegetation Control Pole Clearing – HFTD	N/A	Field	N/A	2023: 1.800 2024: 1.926 2025: 2.061	2023: 95% 2024: 95% 2025: 95%

**TABLE 8-18-1 (REVISED):  
REVISED VEGETATION MANAGEMENT QA PERFORMANCE (FORMERLY QV) PROGRAM  
(CONTINUED)**

<b>Inspection Program</b>	<b>2022 Sample Size<sup>(a)</sup></b>	<b>Type of Audit</b>	<b>Audit Results 2022<sup>(c)</sup></b>	<b>2023-2025 Minimum Sample Size (locations)</b>	<b>Yearly Target Pass Rate</b>
Second Patrol	12,952 Locations	Field	N/A <sup>(b)</sup>	N/A	2023: N/A 2024: N/A 2025: N/A
Second Patrol – HFTD	N/A	Field	N/A	N/A	2023: N/A 2024: N/A 2025: N/A
<p>(a) Sample calculations were done at the location level for QVVM Programs. Locations vary in geographic size and can have multiple trees within one location. Not all trees in a single location may be exclusively HFTD or Non-HFTD. For this reason, it is not possible to break out HFTD and Non-HFTD sample sizes for Distribution and Transmission.</p> <p>(b) In 2022, the distribution score of 91.34 percent reflected both Maintenance Pre-Inspection/Tree Trimming (PI/TT) and Second Patrol (PI/TT).</p> <p>(c) “N/A” in 2022 indicates that PG&amp;E did not conduct an audit of the program.</p> <p>(d) “N/A” in 2023-2025 indicates that PG&amp;E does not plan to conduct an audit of the program during this time.</p>					

PG&E has not revised Table 8-18-2 to provide minimum QC sample sizes and pass rates for 2023 to 2025 for vegetation management QC inspections. As with the System Inspections program, PG&E is working to integrate QC with our vegetation management execution processes to drive quality during initial work execution. We strongly believe this approach will create real-time learnings to coach and guide workers through the work execution process so that work is completed correctly the first time.

Creating WMP QC targets for vegetation management—including large sample sizes and minimum pass rate targets through 2025—would hinder PG&E’s flexibility to reallocate limited quality resources to improve overall work execution and performance. PG&E needs the ability to update the QC program in the future based on learnings from the Quality Management System, which includes both QA and QC functions.

In [Table RN-PG&E-23-02-2](#) below, PG&E shows our vegetation management QC performance year to date. This is the first year that the three programs below have been reviewed by QC inspectors. As indicated, the Distribution QC pass rate is currently below the System Inspection QC pass rates. This is not unexpected given that System Inspections QC work has been occurring for several years. We anticipate that as we continue to perform QC work, and integrate QC with the vegetation management execution processes, we will see improvements in these numbers as we have seen with System Inspections. Improvement will also occur as we adapt our QC processes to real-time issues that we experience in the field throughout this WMP period.



**TABLE RN-PG&E-23-02-2:  
VEGETATION MANAGEMENT QC PROGRAM**

<b>Inspection Program</b>	<b>Type of Audit</b>	<b>2023 YTD Pass Rate Results<sup>(a)</sup> (As of 7/25/2023)</b>
Distribution	Field	84.1%
Distribution VM -HFTD	Field	N/A
Distribution VM – Non-HFTD	Field	N/A
Transmission	Field	98.4%
Transmission VM – HFTD	Field	N/A
Transmission VM – Non-HFTD	Field	N/A
Vegetation Control Pole Clearing	Field	87.8%
Vegetation Control Pole Clearing – HFTD	Field	N/A
Second Patrol	Field	N/A
Second Patrol – HFTD	Field	N/A
<hr/> (a) “N/A” indicates that PG&E does not plan to conduct an audit of the program.		

**Remedy # 3:** *PG&E must provide yearly target pass rates for 2023 through 2025 for its vegetation management QC programs in Table 8-18-2.*

**Response to Critical Issue RN-PG&E-23-02, Remedy # 3**

Please see our response to Critical Issue RN-PG&E-23-02, Remedy 2 above for our response to Energy Safety’s request for yearly target pass rates for 2023 through 2025 for our Vegetation Management QC programs.

## Critical Issue RN-PG&E-23-03

**Critical Issue Title:** *PG&E has not adequately demonstrated workforce planning and resource allocation to address both EPSS risk and wildfire risk.*

*PG&E Must Provide:*

### Response to Critical Issue Remedy a.

**Remedy a:** *Analysis demonstrating PG&E's understanding of safety impacts due to EPSS, including how PG&E considers safety impacts in its analysis and prioritization of mitigations around reducing EPSS risk.*

EPSS is a protective technology that reduces wildfire risk<sup>7</sup> by enabling engineered device settings during periods of elevated wildfire risk. These devices de-energize downstream conductor in 100ms or less if a fault, such as a tree branch in contact with our lines, is detected, overreach fuses to mitigate a wire-down back-feed condition, and provide higher impedance fault detection and de-energization. EPSS increases safety for PG&E customers and communities in High Fire Risk Areas (HFRA) and select HFRA-adjacent areas by mitigating potential ignitions that may otherwise result in a wide-spread, catastrophic wildfire.

Given these significant wildfire safety benefits, we understand the term “EPSS risk,” as used in this Revision Notice Critical Issue, to refer to the non-wildfire safety impacts that sustained, unplanned outages can have for our customers. While PG&E recognizes any interruption to our customers’ service is impactful, when considering the holistic safety impact of EPSS, we prioritize first the public safety benefit wildfire mitigation has for our communities, while in parallel seeking ways to support highly-impacted and vulnerable customers through targeted customer outreach. We also have focused actions such as our EPSS grid-based reliability mitigations including Vegetation Management for Operational Mitigations (VMOM) and Critical Operating Equipment (COE) for EPSS to improve reliability on portions of the grid that experienced a higher rate of EPSS outages in 2022.<sup>8</sup>

Relative to non-wildfire related safety impacts, for most customers EPSS does not introduce a new risk profile above and beyond existing system reliability performance as detailed in our Annual Reliability Reports.<sup>9</sup> We evaluate the impacts of EPSS outages through both outage frequency and duration analysis. We have not experienced significant increases in HFRA outage frequency since the implementation of EPSS. To evaluate outage duration, we monitor EPSS system Customer Average Interruption Duration Index (CAIDI) which represents the average duration of EPSS outages for all customers impacted. This represents a more accurate representation of outage impact than customer totals and full outage durations because it accounts for step restoration

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<sup>7</sup> 2023-2025 WMP, R1, p. 467.

<sup>8</sup> 2023-2025 WMP, R1, ACI PG&E-22-32, p. 962.

<sup>9</sup> Per Decision 16-01-008.

to reflect when power was restored to customers. In 2022, most customers protected by EPSS experienced service reliability consistent with systemwide performance:

- Nearly 58% of the 1.8 million customers within the EPSS Program scope in 2022 did not experience an EPSS outage, with an additional 26% experiencing 2 or fewer outages over the full year.
- The CAIDI for EPSS outages for 2022 was 176 minutes, meaning the average customer during an average EPSS outage was without service for under 3 hours.
- The average customer outage duration for EPSS outages was 3% lower for EPSS outages than all unplanned sustained outages in HFRA in 2022.
- The likelihood of experiencing an extended outage (i.e., an outage of 12 hours or more) on EPSS enabled lines was 29% lower than for all PG&E outages in 2022, and for Medical Baseline or Vulnerable customers the same percentage was 62% lower than for that same population during Non-EPSS outages in 2022.

PG&E understands the impacts that interruptions to electric service can have, such as disruptions to critical infrastructure and devices, impacts to businesses and communications, and other disruptions to daily life and safety. Accordingly, we have targeted our EPSS grid-based reliability mitigations to address areas with known and frequent HFRA EPSS outage activity. These programs are scoped to address the root cause of outage faults (e.g., performing tree trimming in areas with higher vegetation-caused outages); however, we note that fault conditions can lead to an ignition if left unmitigated or if EPSS is not enabled. Accordingly, by addressing these targeted fault conditions, our EPSS grid-based reliability mitigations simultaneously reduce wildfire risk in the HFRA while improving customer experience. We planned and implemented these programs in coordination with other existing PG&E wildfire mitigation programs to address known areas with specific EPSS outage profiles as shown in Remedy b, below.

#### **Response to Critical Issue Remedy b.**

**Remedy b:** *PG&E's workplan for resourcing EPSS-directed mitigation measures, including ratios and work hours shifted from wildfire risk mitigations. Ratios should be provided in the form of estimated percentage of personnel and work hours that would otherwise have been dedicated directly to the same mitigation used to address wildfire risk opposed to EPSS risk. This should be broken down by each mitigation type, including, but not limited to:*

- i. Vegetation management*
- ii. Asset repair and replacement*
- iii. Additional asset inspections*

EPSS reliability mitigations target to improve reliability across circuits highly impacted by EPSS outages. By improving reliability, these programs reduce outages, which has the added safety benefit of reducing wildfire risk due to fewer outages. As shown in [Table RN-PG&E-23-03-01](#) below, these mitigation measures are relatively small in expenditure and do not significantly divert resources from other PG&E wildfire mitigations.

**TABLE RN-PG&E-23-03-1:  
COMPARING EPSS RESOURCES TO OTHER MITIGATION PROGRAMS**

Program Type	Internal Resource Hours			2023 Projected Spend		
	Other PG&E Wildfire Mitigations	EPSS Reliability Mitigation	EPSS Compared to Other Hours	Other PG&E Wildfire Mitigations	EPSS Reliability Mitigation	EPSS Compared to Other Spend
Vegetation Management	4,169,621	76,757 (VMOM)	1.8%	\$1,272M	\$23M (VMOM)	1.9%
Asset Repair and Replacement	2,757,498	111,058 (COE for EPSS)	4.0%	\$1,277M	\$75M (COE for EPSS)	5.9%
Additional Asset Inspections	472,151	N/A	0.0%	\$161M	N/A	0.0%
Undergrounding	1,477,930	21,301	1.4%	\$1,253M	\$10M <sup>(a)</sup>	0.8%

(a) The EPSS reliability mitigation related to undergrounding represents a single reliability focused project that will include undergrounding as a component of its scope.

**Response to Critical Issue Remedy c.**

**Remedy c:** *Details on how PG&E uses EPSS risk to inform the prioritization of its mitigations in comparison to wildfire risk for all subparts listed in (b). For example, PG&E must provide details on how EPSS risk informs its asset repair and replacement program and may impact prioritization of work as a result.*

Consideration of EPSS risk to inform prioritization of other mitigation programs is detailed in the table below. Generally, our EPSS reliability mitigations target continued reduction of wildfire risk by addressing highly frequent outage patterns or profiles experienced in 2022.

**TABLE RN-PG&E-23-03-2:  
MITIGATION PRIORITIZATION CONSIDERING EPSS RISK**

<b>Program</b>	<b>EPSS Outage Profile</b>	<b>Existing Program Prioritization</b>	<b>EPSS Risk Consideration</b>
Vegetation management	High frequency vegetation-caused 2022 EPSS outages	Applicable wildfire risk and compliance driven maintenance cycles.	EPSS risk is not a primary driver of existing vegetation management programs. Accordingly, a dedicated and targeted vegetation management program, VMOM, was created by our EPSS program to address this outage profile on highly-impacted circuit zones and represents a small percentage of overall vegetation spend.
Asset repair and replacement	High frequency equipment-caused 2022 EPSS outages	PG&E's open work orders (tag or notifications) program uses a risk-informed prioritization approach to address the highest risk issues on its system. <sup>(a)</sup>	Open work orders (tags or notifications) on EPSS circuits are generally not prioritized over tags on non-EPSS circuits except for EPSS devices on PG&E's Critical Operating Equipment (COE) list.
Additional asset inspections	N/A	Applicable wildfire risk and compliance driven maintenance cycles.	EPSS risk is not a driver of existing asset inspection maintenance plans.
Undergrounding	N/A	The 2023-2026 undergrounding portfolio is focused on undergrounding lines in the highest risk areas, which include the following: (1) Top Ranked Circuit Segments based on WDRMs; (2) Fire Rebuilds; (3) PSPS Mitigation Projects; and (4) PG&E's PSS Identification. <sup>(b)</sup>	PG&E currently does not use EPSS risk as a part of our decision-making framework for scoping of locations for undergrounding work. However, EPSS may be a factor for consideration in future underground project scoping.

(a) 2023-2025 WMP, R1, p. 447.

(b) 2023-2025 WMP, R1, p. 344.

## Response to Critical Issue Remedy d.

**Remedy d:** *Justification for reallocating resources towards EPSS risk, as opposed to high wildfire risk. This should include using the analysis performed in parts (a) and (b) in conjunction with detailed mitigation effectiveness calculations.*

As shown in response to Remedy b, the allocation of resources for EPSS risk among the wildfire mitigations listed in [Table RN-PG&E-23-03-01](#) is approximately 2.3 percent and 2.6 percent of PG&E's total work hours and spend, respectively. Nonetheless, our EPSS grid-based mitigations provide critical improvement to customer experience and risk reduction for both ignition and reliability risk in HFTD/HFRA and adjacent areas with high EPSS outage frequency. PG&E does not have detailed mitigation effectiveness analysis at this time. These analyses are being developed based on subject matter expertise while empirical data is being collected.

EPSS is an effective operational mitigation that has the potential to be deployed quickly to address the threat of wildfire.<sup>10</sup> PG&E estimates that by the end of this WMP cycle, we will have reduced wildfire risk in the HFTD/HRFA by 94 percent through a combination of permanent risk reduction (system resilience mitigations) and operational mitigations such as EPSS.<sup>11</sup>

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<sup>10</sup> 2023-2025 WMP, R1, p. 260.

<sup>11</sup> 2023-2025 WMP, R1, p. 260.

## Critical Issue RN-PG&E-23-04

**Critical Issue Title:** *PG&E does not demonstrate how it will address its growing backlog of asset repairs.*

*PG&E Must Include:*

**Remedy a.** *In relation to ignition-risk targets:*

- i. A workplan for monitoring and mitigating existing highest risk ignition tags until PG&E is able to address such tags, particularly for any ignition-tags that PG&E has delayed since the 2022 WMP.*

### Introduction

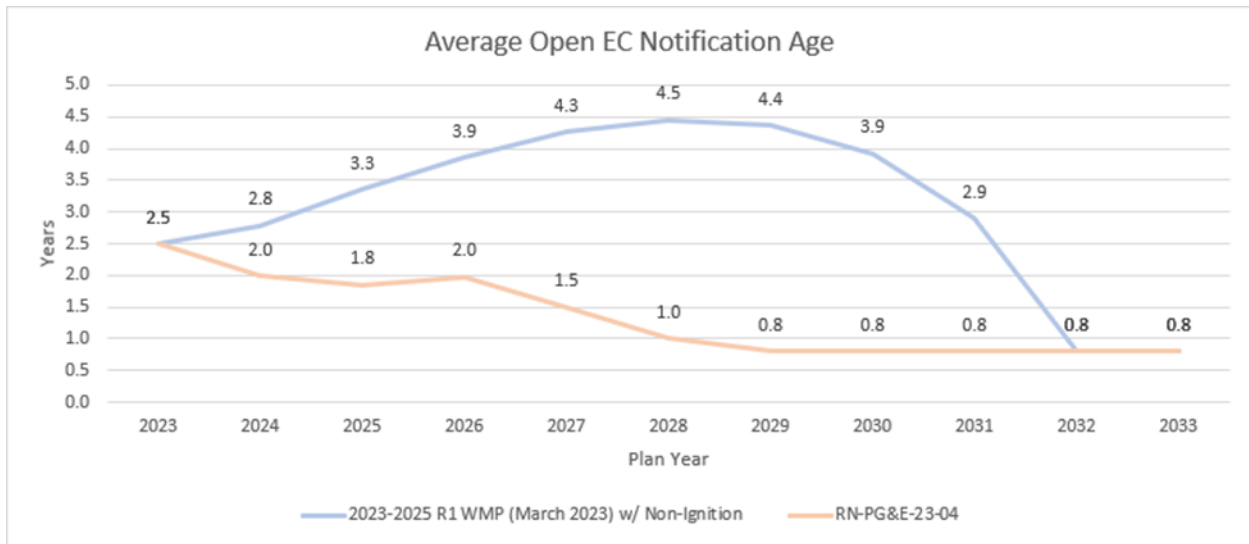
PG&E recognizes Energy Safety's concern with our backlog of asset repair tags. We have developed a revised plan to address the growing backlog of distribution asset repairs in the HFTD by the end of 2029—three years sooner than we proposed in our March 2023 WMP submittal. We will accelerate our program by bundling and working tags by isolation zone instead of working newly created tags to meet current GO95 time requirements, described as Steady State previously. Bundling by isolation zone provides us the flexibility to address the most risk first through a risk spend efficiency (RSE) approach and will provide nearly \$1 billion in execution efficiency through 2029 with equivalent risk reduction. Our revised plan maintains and may exceed the original risk buy-down profile and provides a specific HFTD EC Maintenance Log target as required by Energy Safety.

To close as many tags as quickly as possible, we are revising the plan we proposed in our March 2023 WMP submission. Under our revised plan, we will not complete non-pole maintenance tag work by the end of 2025, pole work by the end of 2029 and non-ignition tags by the end of 2032. Instead, we will eliminate the entire HFTD maintenance tag backlog by 2029 prioritizing work in isolation zones to achieve the most risk reduction that we can with the available resources.

Under our revised plan PG&E has replaced Objectives GM-04 and GM-05 (our 3-year and 7-year backlog elimination plans) with Objective GM-08 and modified Target GM-03 (shown in response to Remedy a(ii) below).

[Figure RN-PG&E-23-04-1](#) below illustrates how our revised plan will reduce the average age of an open tag because PG&E will be addressing older tags earlier than the plan we proposed in the March 2023 WMP.

**FIGURE RN-PG&E-23-04-1:  
COMPARING PLANS TO CLOSE ELECTRIC CORRECTIVE MAINTENANCE NOTIFICATIONS**



Bundling work in isolation zones also reduces the number of customer clearances required and improves customer satisfaction. Through bundling in isolation zones, PG&E’s asset maintenance teams coordinates with other lines of business so that customers only experience one planned outage while we complete all the work needed in that zone at one time. When we bundle work, we show up as one team, we eliminate waste, and we improve customer satisfaction.

**Response to Critical Issue RN-PG&E-23-04, Remedy a(i)**

The focus of this Revision Notice Critical Issue is the backlog of Distribution asset repairs. The plan for transmission asset repairs is not modified by this approach.

PG&E has 657,074 distribution poles in HFTD and HFRA as part of our distribution electric system.<sup>12</sup> To minimize the risk of wildfire due to failure of these assets, PG&E has an extensive inspection program that incorporates detailed ground inspections, aerial inspections, intrusive inspections, patrols, and other opportunistic inspections. We describe the frequency or trigger for each type of inspection in Section 8.1.3 and in Table 8-6 of our 2023-2025 WMP. PG&E far exceeds the general order requirements in the amount and variety of inspections performed on our HFTD/HFRA distribution system. The inspections we conduct ensure that we get eyes on the riskiest portions of our system in multiple ways, and multiple times, to identify hazards before they become failures.

In addition to PG&E’s inspection programs, PG&E has implemented an Enhanced Powerline Safety Settings (EPSS) Program, which incorporates the knowledge gained from our inspection programs, and many other factors, to significantly reduce the

<sup>12</sup> As of June 28, 2023.



amount of energy released if one of our assets fails.<sup>13</sup> When PG&E is setting the parameters for an EPSS-enabled circuit, we prioritize distribution lines with open ignition risk electric corrective (EC) notifications thereby adding another layer of protection from asset failure that could lead to an ignition. In addition, we deploy other mitigations such as vegetation management inspection, Downed Conductor Detection (DCD), pole clearing and Public Safety Power Shutoff (PSPS) to keep our system safe.

PG&E anticipates creating tens of thousands of new EC notifications, or tags, as a result of these inspections conducted each year. These tags range in nature from rotten/decayed poles or deteriorated conductors, to missing “high voltage” signs or reflectors. PG&E uses a four-tier system to distinguish the likelihood of failure using the designations A, B, E, or F. These designations align to GO 95, Rule 18 requirements as shown in Table PG&E-8.1.7-1 of PG&E’s 2023-2025 WMP.

[Table RN-PG&E-23-04-1](#) illustrates how PG&E will work down the backlog of repairs.

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<sup>13</sup> 2023-2025 WMP, R1, Section 8.1.8.1.

**TABLE RN-PG&E-23-04-1:  
2023-2029 MAINTENANCE EXECUTION PLAN IN THE HFTD/HFRA<sup>(a)(e)</sup>**

<b>Plan Year</b>	<b>Total Inspections<sup>(b)</sup></b>	<b>New Tags Created</b>	<b>New Tags Executed<sup>(c)</sup></b>	<b>Backlog within Year<sup>(d)</sup> (New Tags Backlog)</b>	<b>New Tags Backlog Cumulative</b>	<b>Aged Backlog<sup>(f)</sup> Units Executed</b>	<b>Aged Backlog<sup>(f)</sup> Units Remaining</b>
2023	272,000	85,000	23,000	62,000	62,000	29,000	230,000
2024	329,000	64,000	37,000	27,000	89,000	66,000	164,000
2025	339,000	66,000	46,000	20,000	109,000	59,000	105,000
2026	335,000	74,000	72,000	2,000	111,000	40,000	65,000
2027	329,000	64,000	38,000	26,000	137,000	65,000	0
2028	272,000	71,000	110,000	(39,000)	98,000	0	0
2029	272,000	71,000	110,000	(39,000)	59,000	0	0

- (a) The number of tags in our execution plan exceeds our targets to account for unforeseen delays or other mitigating factors.
- (b) The total inspections per year and new tags created come from [Table RN-PG&E-23-04-7](#), 2023-2029 Forecast Find Rates by Inspection Rate in response to Remedy d(iii) below. Excludes (due to low impact) patrol and infrared inspections in the HFTD/HFRA.
- (c) Refers to the number of tags created and closed in the same calendar year.
- (d) Refers to the number of tags opened but not closed in a calendar year.
- (e) Differences due to rounding.
- (f) Backlog is defined as the open ignition EC notifications known as of January 5, 2023, and found prior to Jan 1, 2023, in HFTD/HFRA locations.

- ii. A revised and complete Table 8-3 with concrete numeric targets for addressing the backlog of work orders, in addition to the risk-reduction percentage targets already provided.*

**Response to Critical Issue RN-PG&E-23-04, Remedy a(ii)**

[Table RN-PG&E-23-04-2](#) below is Target GM-03 from WMP Table 8-3, which includes concrete numeric targets for addressing our backlog of work orders, as well as the risk reduction percentage targets already provided. We are including only the single, impacted line from Table 8-3 here for brevity.

The complete Revised Table 8-3 is included in Section 8.1.1.2 of our final 2023-2025 WMP.

**TABLE RN-PG&E-23-04-2:  
REVISED DISTRIBUTION OPEN TAG REDUCTION TARGETS BY YEAR**

Target Name	Initiative Activity Tracking ID	Reference Section	2023 Target & Unit	x% Risk Impact 2023	2024 Target & Unit	x% Risk Impact 2024	2025 Target & Unit	x% Risk Impact 2025	Method of Verification
HFTD/HFRA Open Tag Reduction – Distribution Backlog	GM-03	<a href="#">8.1.7.2</a>	<p>Close 52,000 distribution EC notifications, which at a minimum 29,000 are distribution backlog<sup>(a)</sup> ignition risk EC notifications.</p> <p>This work will reduce 48 percent of the wildfire risk associated with backlog ignition risk EC notifications in HFTD/HFRA locations from 151.1 (risk units as of January 1, 2023) by 72.5 (48 percent) risk units.</p>	2.2% non-pole <1% pole	<p>Close at least 25,000 additional EC notifications on top of closing an equivalent number of EC notifications created in HFRA/HFTD locations in 2024. Based on the forecasted amount of new EC notifications, we expect a total forecasted execution plan of 89,000 EC notifications for 2024. Of these EC notifications, we expect to close 46,000 distribution backlog<sup>(a)</sup> ignition risk EC notifications with the remaining balance to be from backlog or newly identified EC notifications.</p> <p>This work will reduce 68 percent of the wildfire risk associated with backlog ignition risk EC notifications in HFTD/HFRA locations over the 2-year period (2023 to 2024), from 151.1 risk units—as of January 1, 2023—by 102.7 risk units (68 percent).</p>	<1% non-pole <1% pole	<p>Close at least 25,000 additional EC notifications on top of closing an equivalent number of EC notifications created in HFRA/HFTD locations in 2025. Based on the forecasted amount of new EC notifications, we expect a total forecasted execution plan of 92,000 EC notifications. Of these EC notifications, we expect to close out 55,000 distribution backlog<sup>(a)</sup> ignition risk EC notifications with the remaining balance to be from backlog or newly identified EC notifications.</p> <p>This work will reduce 77 percent of the wildfire risk associated with backlog ignition risk EC notifications in HFTD/HFRA locations over the 3-year period (2023 to 2025), from 151.1 risk units—as of January 1, 2023—by 116.3 risk units (77 percent).</p>	<1% non-pole <1% pole	Closed work orders

(a) Backlog is defined as the open ignition EC notifications known as of January 5, 2023, and found prior to Jan 1, 2023, in HFTD/HFRA locations.

**Remedy b.** *In relation to the closure of 2022 tags and status of 2023 tags:*

- i. Its procedures and documentation for determination of ignition-risk tags. This should include, but not be limited to: Asset repair and replacement.*
  - 1. Any criteria used by PG&E for determining ignition risk, such as modeling output (including both ignition and consequence risk), equipment type, and equipment age; and*
  - 2. The process for prioritizing the closure of tags based on the calculated ignition risk.*

**Response to Critical Issue RN-PG&E-23-04, Remedy b(i)**

PG&E identifies ignition-related transmission tags primarily based on Facility Damage Actions (FDAs) that align with ignition-related components in the T-line Failure Modes and Effects Analysis (FMEA), but the identifications can be modified based on subject matter expertise. PG&E does not have a procedure document for determining ignition-risk tags. For example, lines that have been permanently de-energized and grounded to mitigate induction are not considered ignition-related.

PG&E identifies ignition-related distribution tags based on FDAs that align with failure modes that could cause an ignition. The FDAs that pose an ignition risk were agreed upon by a team of Subject Matter Experts (SMEs) from Electric Asset Strategy, Wildfire Risk, and the Standards and Work Methods teams.

PG&E's SMEs analyzed combinations of facilities, damage, and action and indicated whether the specific facility/damage/action combination (failure mode) can create an ignition risk. The notifications that contain FDAs flagged as potential ignition risk are categorized as ignition-risk tags.

[Table RN-PG&E-23-04-3](#) below are examples of the FDA model mapping that PG&E developed to determine maintenance tag ignition risk.<sup>14</sup>

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<sup>14</sup> PG&E submitted the complete FDA model map in response to WMP-Discovery\_2023\_DR\_OEIS\_006-Q008Atch01.

**TABLE RN-PG&E-23-04-3:  
EXAMPLES OF FDA IGNITION RISK MAPPING**

<b>Facility</b>	<b>Damage</b>	<b>Action</b>	<b>Mapping to Risk Model<sup>(a)</sup></b>
High Sign	Missing	Install	Out of Scope
Pole	Decayed/Rotten	Replace	Support Structure Equipment Cause
Connector	Incorrectly Installed	Replace	Conductor Composite
Pole	Broken/Damaged	Replace	Support Structure Equipment Cause
Guy	Overgrown	Trim	Out of Scope

(a) Items mapped to a risk model can create an ignition risk. Items mapped “out of scope” do not create an ignition risk.

PG&E’s highest priority are Level 1 (GO 95, Rule 18 classification) or Level A (PG&E classification) tags that pose an immediate risk of high potential impact to safety or reliability and are addressed immediately. PG&E executed more A tags in the first two quarters of 2023 due to the severe storms we experienced early in 2023 than we completed in all of 2022. In total, PG&E forecasts closing approximately 23,000 HFTD A tags in 2023 compared to the approximately 12,500 HFTD A tags we closed in 2022.

PG&E’s second priority are Level 2 or Level B tags that pose at least a moderate potential impact to safety or reliability. PG&E corrects Level 2/Level B tags within 3 months.

PG&E prioritizes the remaining tags based on their wildfire risk value using our Wildfire Distribution Risk Model version 3 (WDRM v3). The WDRM v3 considers the location of the asset and provides the consequence of failure and the likelihood of an ignition based on the Facility Damage Action (FDA). These two factors combined provide a wildfire risk value for each EC notification. If a tag does not have any ignition risk (e.g., “missing high sign install”), then the tag is designated as an F tag and will be deprioritized compared to any HFTD/HFRA tag with an ignition risk.<sup>15</sup>

Starting in 2024, PG&E will be prioritizing E and F tags through a bundled risk spend efficiency approach.<sup>16</sup> A and B tags are not included in the bundling approach. A tags are addressed immediately and B tags are addressed in an expedited manner, typically less than 90 days. While we anticipate that most of the E and F tags will be prioritized this way, there will be instances where a different approach may be warranted. For example, there may be times when a higher risk value E tag will be executed separately

<sup>15</sup> Certain F tags have ignition risk and will be prioritized and executed based on the risk that they pose.

<sup>16</sup> PG&E will develop a risk spend efficiency by isolation zone bundle and not for individual tags. We will identify groupings of EC notifications in an isolation zone (similar to a circuit protection zone) and sum the wildfire risk of those notifications. That sum will be divided by the sum of the average unit cost of those same notifications to get a risk spend efficiency by isolation zone bundle.

from the rest of an isolation zone<sup>17</sup> because it is a higher priority than others in the bundle. Additionally, if we encounter constraints, we may bypass an isolation zone and execute work in a different zone with a lower risk spend efficiency to continue reducing the backlog of tags. Some tags with a low risk spend efficiency score may be excluded from the isolation zone to allow PG&E to shift resources to higher priority units.

The bundled risk spend efficiency approach will enable us to execute EC notifications more efficiently by reducing the number of times we perform corrective work on the same circuit, executing more tags with the same resources, and reducing the number of clearances required to close tags.

PG&E is proposing to use the bundled risk spend efficiency approach through 2029 to reduce our backlog of tags.

In 2024, we will close at least 25,000 additional EC notifications on top of closing an equivalent number of EC notifications created in HFRA/HFTD locations in 2024. Based on the forecasted amount of new EC notifications, we expect a total forecasted execution plan of 89,000 EC notifications for 2024.<sup>18</sup> Of these EC notifications, we expect to close out 46,000 distribution backlog ignition risk EC notifications with the remaining balance to be from backlog or newly identified EC notifications.

In 2025, we will close at least 25,000 additional EC notifications on top of closing of an equivalent number of EC notifications created in HFRA/HFTD locations in 2025. Based on the forecasted amount of new EC notifications, we expect a total forecasted execution plan of 92,000 EC notifications. Of these EC notifications, we expect to close out 55,000 distribution backlog ignition risk EC notifications with the remaining balance to be from backlog or newly identified EC notifications.

PG&E's proposal to reduce our backlog of HFTD tags by the end of 2029 means that we will not be working on the same timelines as required by GO95 rule 18 for E and F tags only until we eliminate the backlog—A and B priority tags will be completed in accordance with GO95 rule 18 timelines. We will monitor and manage the risk associated with the open tags using our portfolio of Comprehensive Monitoring and Data Collection and Operational Mitigations. Each circuit segment is protected by multiple mitigations such as aerial and ground asset inspections, vegetation management inspection, Downed Conductor Detection (DCD), pole clearing, EPSS, and PSPS. These layers of protection help to reduce wildfire risk across the system until maintenance activities occur. Additionally, PG&E will have eyes on assets by way of patrols that occur at least annually.

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<sup>17</sup> An isolation zone is an area between isolation devices that can be de-energized in support of maintenance purposes.

<sup>18</sup> Please note that the 2024 and 2025 total execution numbers provided here are forecasts and the actual number of EC notifications executed in 2024 and 2025 could be greater or smaller than the 89,000 and 92,000 numbers, depending on how many notifications are newly created in 2024 and 2025, respectively.

ii. *A status update on the number of backlog work orders since the start of 2023. This should include the same information as provided in Table 13 of the Quarterly Data Report (QDR) for both open and closed tags, along with the following additional columns:*

1. *GO 95 Rule 18 Priority Level;*
2. *PG&E Priority Level (if such differs from GO 95 Rule 18);*
3. *Whether or not the finding qualifies as an “Ignition-Risk HFTD/HFRA” tag; and*
4. *Whether the infraction is Non-Pole or Pole.*

#### **Response to Critical Issue RN-PG&E-23-04, Remedy b(ii)**

See Attachment 2023-08-07\_PGE\_23-04\_RNR\_R0\_Atch01 for information responsive to this Critical Issue Remedy. More specifically:

- The Go 95 Rule 18 Priority Level is in Column M. For this column, PG&E has copied the data as shown in Column G, noting the GO 95 rule 18 priority level of the original work order;
- The PG&E Priority Level (if such differs from GO 95 Rule 18) is in Column N;
- Whether or not the finding qualifies as an “Ignition-Risk HFTD/HFRA” tag is in Column O; and
- Whether the infraction is Non-Pole or Pole is in Column P.

#### **Remedy c. In relation to Field Safety Reassessments (FSRs):**

i. *PG&E must show that its existing procedures adequately address open work orders within the initially set repair time frame and that PG&E is not using FSR to delay the closure of work order tags. This could be through updating its procedures to clarify and require inspectors performing FSRs to change due dates only if the tag priority increases. As part of its response, as applicable, PG&E must provide any updated procedures demonstrating changes made, including redlines from previous procedures and any necessary screenshots of applications used by inspectors.*

#### **Response to Critical Issue RN-PG&E-23-04, Remedy c(i)**

The purpose of the FSR program is to provide the best opportunity to operate our system safely while we work toward eliminating our tag backlog. As described in response to Remedy b(i)2 above, because PG&E will continue to have notifications open longer than the GO 95, Rule 18 requirements through 2029—we are using multiple methods to contain the risk associated with them. Along with the risk management methods described in response to Remedy b(i)2 above, the FSR process provides another layer of risk containment.



The FSR program is focused on identifying known conditions that have escalated to Priority A and B so that these conditions can be remedied. FSRs are field safety checks of EC notifications that have been previously identified but will not be addressed before their due date. We monitor open tags by conducting FSRs on notifications that have potential safety impacts. FSRs are performed by an Inspector or other Qualified Electrical Worker who confirms the current field condition of the notification and escalates it for resolution on a more expedited timeline if needed. Inspectors can also recommend that a notification be canceled if they believe it was created in error or if it was already completed. For example, if the tag is no longer required according to PG&E's guidelines, or if they find all work identified on the EC notification is already completed in the field.

The FSR process is not intended to downgrade or extend GO 95, Rule 18 tag due dates. We are revising FSR procedure (TD-8123P-200), which will clarify that FSR's cannot extend the time required by PG&E or CPUC requirements for closing an open tag or downgrade an EC tag priority. We expect to publish the revised procedure by the end of 2023.

PG&E has an interim process in place that prevents FSRs from extending the timing of a tag. PG&E has no recorded incidents of an FSR extending the due date for a tag in 2023.

***Remedy d. In relation to increased find rates:***

*i. PG&E's analysis on the specific causes of increased find rates. This should include the estimated percentages, clarifying any overlap, from increases due to, but not limited to:*

- 1. Improved checklist;*
- 2. Improved training;*
- 3. Continued degradation of infrastructure due to aging; and*
- 4. Continued degradation of infrastructure due to weather.*

**Response to Critical Issue RN-PG&E-23-04, Remedy d(i)**

[Table RN-PG&E-23-04-4](#) shows PG&E ground detailed inspection data as of June 30, 2023 for tag find rates (EC notifications created per assets inspected) in the non-HFTD/HFRA, HFTD Tier 2, HFTD Tier 3, and Zone 1 for 2022 and Q1 and Q2 of 2023.

The overall find rate is driven by increased find rates in E tags in Tier 2 which accounted for 70 percent of the total tags created in HFTD/HFRA.<sup>19</sup>

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<sup>19</sup> The 70 percent is calculated as: E tag find rate in Tier 2 (23.61%) x Total Inspection Count in Tier 2 (68,425) divided by 2023 Inspection Count (77,693) x Find Rate by Tier (29.83%).  
 $(23.61\% \times 68,425) / (77,693 \times 29.83\%) = 70\%$ .

**TABLE RN-PG&E-23-04-4:  
TAG FIND RATES, GROUND DETAILED INSPECTIONS (DATA AS OF 6/30/23)**

Tier	2022						2023					
	A Find Rate	B Find Rate	E Find Rate	F Find Rate	Inspection Count	Find Rate by Tier	A Find Rate	B Find Rate	E Find Rate	F Find Rate	Inspection Count	Find Rate by Tier
Non-HFTD/HFRA	0.28%	1.10%	17.23%	3.36%	3,633	21.77%	0.65%	1.63%	21.67%	5.92%	2,146	31.55%
Tier 2	0.22%	1.29%	22.66%	4.13%	190,121	28.13%	0.50%	2.17%	23.61%	4.41%	68,425	30.51%
Tier 3	0.16%	0.91%	13.56%	2.80%	206,177	17.34%	0.67%	1.21%	14.70%	3.16%	7,122	19.60%
Zone 1	0.70%	0.70%	16.20%	4.23%	426	21.60%	N/A	N/A	N/A	N/A	N/A	N/A
Total	0.19%	1.09%	17.93%	1.44%	199,357	22.66%	0.52%	2.07%	22.79%	4.34%	77,691	29.83%

Note: The tag find rates in [Table RN-PG&E-23-04-4](#) do not include cancelled tags. Find rate is the percent of EC notifications created per pole inspected. There have been no EC notifications created in Zone 1 in 2023 to date.

We analyzed the find rate data to determine which FDAs had the biggest impact on the overall finds. [Table RN-PG&E-04-5](#) below shows the six FDAs where more than 1,000 E tags were created in the HFTD in 2023 and either (1) there is an increase in find rate compared to 2022; or (2) the tags are associated with a new FDA.

Based on this criteria, PG&E then researched what was driving the increased find rates for this population of E tags in the Tier 2 HFTD. [Table RN-PG&E-04-5](#) below shows that a change in guidance and improved training was the main driver for the increase in each of the six FDA categories. We are unable to determine if increased find rates for this population of tags was due to degradation due to weather conditions or aging assets.

**TABLE RN-PG&E-23-04-5:  
DRIVERS OF INCREASED FIND RATES, E TAGS IN THE HFTD**

<b>F-D-A</b>	<b>2023 Tags</b>	<b>Delta Find Rate</b>	<b>Guidance Change</b>	<b>Highlighted by QA/QC in 2022</b>	<b>2023 Training Emphasis</b>	<b>Notes</b>
Pole Decayed/Rotten Replace	3,736	155	X		X	Job Aid to 2305M JA02 was updated in 2023 with examples and more pictures on how to identify rotten poles. The topic was also highlighted as part of 2023 training. Refer to page 162-164 of TD 2305M JA02 Rev. 11 for more details. <sup>(a)</sup>
Pole Woodpecker Damage Assessment	2,830	114	X		X	Job Aid to 2305M JA02 was updated in 2023 with examples and more pictures on how to identify woodpecker damage on poles. The topic was also highlighted as part of 2023 training. Refer to page 168 of TD 2305M JA02 Rev. 11 for more details.
Hardware/Framing Loose Adjust	2,907	608	X		X	Job Aid to 2305M JA02 was updated in 2023 with new guidance on identifying Cotter Key partially backed out. This condition was also tagged with Hardware/Loose/Adjust PDA. Refer to page 122 of TD 2305M JA 02 Rev. 11 for more details.
Pole Woodpecker Damage Replace	1,904	New FDA	X		X	This was a new FDA added in 2023 in SAP. Job Aid TD 2305M JA02 was updated in 2023 with new guidance to directly create a Woodpecker Damage/replace tag if the damage is sufficient or if the woodpecker holes are near the framing hardware. Refer to page 168 and 169 of TD 2305M JA02 Rev. 11 for more details.
Pole Woodpecker Damage Repair	1,288	New FDA	X		X	This was a new FDA added in 2023 in SAP. This allows inspectors to directly create a Woodpecker Damage/Replace tag and they determine if the damage can be repaired or needs to be replaced.
Guy Loose Adjust	1,208	212	X	X	X	Job Aid TD 2305M JA02 was updated in 2023 to provide further clarification that any guy that is 2" from taut should be tagged as Guy/Loose/Adjust in addition this condition highlighted as part of the QA/QC findings in 2022.
<p>(a) See Appendix E for Job Aid to 2305M JA02,</p>						

- i. An estimated expected find rate per quarter broken down by priority level for the remainder of 2023 through 2025.

[Table RN-PG&E-23-04-6](#) shows the estimated forecast number of tags that will be created by quarter and by priority for 2023-2025. PG&E interpreted “find rate per quarter” as the number of tags forecasted to be created per quarter.

Note that Q1 & Q2 2023 Actuals are extracted from the Q2 QDR submitted on August 1, 2023.

**TABLE RN-PG&E-23-04-6:  
2023-2025 FORECAST TAGS CREATED**

	2023 Actual and Forecasted Tags Creation <sup>(c)</sup>				
Priority Level	Q1 (actual)	Q2 (actual)	Q3	Q4	Total
L2 <sup>(a)</sup>	1,200	23,000	34,500	11,500	70,200
L3 <sup>(b)</sup>	100	4,000	8,000	2,700	14,800

	2024 Forecasted Tags Creation <sup>(c)</sup>				
Priority Level	Q1	Q2	Q3	Q4	Total
L2 <sup>(a)</sup>	800	17,200	27,000	9,000	54,000
L3 <sup>(b)</sup>	200	3,300	5,200	1,700	10,400

	2025 Forecasted Tags Creation <sup>(c)</sup>				
Priority Level	Q1	Q2	Q3	Q4	Total
L2 <sup>(a)</sup>	800	17,700	27,900	9,300	55,700
L3 <sup>(b)</sup>	200	3,400	5,400	1,800	10,800

- (a) A Level 2 (L2) tag is a GO95, Rule 18 priority level that aligns to PG&E priority Level B or Level E. Level B or E tags presents a risk of at least moderate potential impact to safety or reliability.
- (b) A Level 3 (L3) tag is a GO95, Rule 18 priority level that aligns to PG&E priority Level F. Level F tags present a risk of low potential impact to safety or reliability.
- (c) PG&E has not included a forecast for A tags in this analysis because the focus of this Critical Issues is how PG&E is addressing its backlog of maintenance tags. Since PG&E immediately addresses all A tags, we do not have an A tag backlog. .

*i. PG&E's plan to timely address the potential increase in work order tags resulting from additional inspections as part of its plan to address its backlog. This must include:*

- 1. Estimates on the number of new work orders broken down by additional inspection type.*

PG&E will address potential increases in work order tags resulting from additional inspections using the bundling approach described above. Bundling tags and working in isolation zones will enable us to accelerate our program and address potential increases in work order tags.

[Table RN-PG&E-23-04-7](#) below shows the forecast finds by inspection type 2023-2029.

**TABLE RN-PG&E-23-04-7:  
2023-2029 FORECAST FINDS BY INSPECTION TYPE**

Inspection Type	Tier	Priority <sup>(c)</sup>	Find Rate	Annual Inspections 2023		Annual Inspections 2024		Annual Inspections 2025		Annual Inspections 2026		Annual Inspections 2027		Annual Inspections 2028		Annual Inspections 2029	
				Planned by Tier	F'cst Tag Find	Planned by Tier	F'cst Tag Find	Planned by Tier	F'cst Tag Find	Planned by Tier	F'cst Tag Find	Planned by Tier	F'cst Tag Find	Planned by Tier	F'cst Tag Find	Planned by Tier	F'cst Tag Find
Aerial <sup>(a)</sup>	Non-HFTD/HFRA	B	#N/A <sup>(d)</sup>	700	0	900	0	900	0	900	0	900	0	700	0	700	0
Aerial <sup>(a)</sup>	Non-HFTD/HFRA	E	#N/A		0		0		0		0		0		0		0
Aerial <sup>(a)</sup>	Non-HFTD/HFRA	F	#N/A		0		0		0		0		0		0		0
Aerial <sup>(a)</sup>	Tier 2	B	2.58%	30,000	774	30,000	774	30,000	774	30,000	774	30,000	774	30,000	774	30,000	774
Aerial <sup>(a)</sup>	Tier 2	E	1.57%		471		471		471		471		471		471		471
Aerial <sup>(a)</sup>	Tier 2	F	0.49%		147		147		147		147		147		147		147
Aerial <sup>(a)</sup>	Tier 3	B	2.42%	7,300	177	7,300	177	7,300	177	7,300	177	7,300	177	7,300	177	7,300	177
Aerial <sup>(a)</sup>	Tier 3	E	0.82%		60		60		60		60		60		60		60
Aerial <sup>(a)</sup>	Tier 3	F	0.22%		16		16		16		16		16		16		16
Ground <sup>(b)</sup>	Non-HFTD/HFRA	B	#N/A	4,800	0	4,400	0	2,200	0	3,900	0	4,400	0	4,800	0	4,800	0
Ground <sup>(b)</sup>	Non-HFTD/HFRA	E	#N/A		0		0		0		0		0		0		0
Ground <sup>(b)</sup>	Non-HFTD/HFRA	F	#N/A		0		0		0		0		0		0		0
Ground <sup>(b)</sup>	Tier 2	B	2.21%	209,600	6,762	127,400	2,815	121,500	2,684	199,000	4,396	127,400	2,815	209,600	4,631	209,600	4,631
Ground <sup>(b)</sup>	Tier 2	E	24.37%		60,158		31,039		29,600		48,479		31,039		51,072		51,072
Ground <sup>(b)</sup>	Tier 2	F	5.42%		14,362		6,903		6,583		10,782		6,903		11,359		11,359
Ground <sup>(b)</sup>	Tier 3	B	1.79%	6,300	90	89,500	1,601	108,200	1,938	24,300	435	89,500	1,601	6,300	113	6,300	113
Ground <sup>(b)</sup>	Tier 3	E	15.44%		1,079		13,811		16,713		3,752		13,811		978		978
Ground <sup>(b)</sup>	Tier 3	F	3.74%		276		3,346		4,048		909		3,346		237		237
Ground <sup>(b)</sup>	Zone 1	B	2.34%	200	0	100	1	200	4	200	4	100	1	200	4	200	4
Ground <sup>(b)</sup>	Zone 1	E	17.76%		0		10		33		33		10		33		33
Ground <sup>(b)</sup>	Zone 1	F	5.14%		0		3		9		10		3		10		10
PTT	Tier 2	E	4.89%	8,700	427	46,000	2,249	46,000	2,249	46,000	2,249	46,000	2,249	8,700	427	8,700	427
PTT	Tier 3	E	4.35%	4,400	190	23,000	1,001	23,000	1,001	23,000	1,001	23,000	1,001	4,400	190	4,400	190
Total <sup>(e)(f)(g)</sup>				272,000	84,989	328,600	64,424	339,300	66,506	334,600	73,695	328,600	64,424	272,000	70,699	272,000	70,699

(a) Aerial find rates based off 2023 actuals, matches future planned aerial inspection process.  
(b) 2024 and beyond ground find rates based on 2022 actuals, predicted to most align with future inspection processes.  
(c) PG&E has not included a forecast for A tags in this analysis because the focus of this Critical Issues is how PG&E is addressing its backlog of maintenance tags. Since PG&E immediately addresses all A tags, we do not have an A tag backlog.  
(d) "N/A" indicates that we are not forecasting any finds in that combination of inspection type and tier.  
(e) Planned inspections and inspection find rates are projections based on current information  
(f) Excludes Patrols and Infrared inspections in the HFTD/HFRA because they account for less than 1 percent of the finds.  
(g) Differences due to rounding.

2. A revised Table PG&E-8.1.7-2 with any updated estimates based on additional work orders for each inspection type, if applicable.

Below is a revised [Table PG&E-8.1.7-2](#).

**TABLE PG&E-8.1.7-2 (REVISED):  
REVISED ADDRESSING INFRACTIONS FOUND DURING INSPECTIONS**

	Ignition-Risk HFTD/HFRA Notifications			Non-Ignition Risk HFTD/HFRA (D)	Total Notifications <sup>(a)</sup> (E) = (C) + (D)
	Non-Pole	Pole	Total <sup>(a)</sup>		
	(A)	(B)	(C) = (A)+ (B)		
Backlog as of July 24, 2023	91,400	92,000	183,400	47,000 <sup>(b)</sup>	230,400
Year 1: 2024	(35,000)	(31,200)	(66,200)	0	(66,200)
Year 2: 2025	(29,400)	(29,600)	(59,000)	0	(59,000)
Total Notifications Closed	(64,400)	(60,800)	(125,200)	0	(125,200)
Total Notifications Remaining at the end of the 2023-2025 WMP cycle	27,000	31,200	58,200	47,000	105,200
Year 3: 2026	(12,400)	(21,300)	(33,700)	(6,400)	(40,100)
Year 4: 2027	(14,600)	(9,900)	(24,500)	(40,600)	(65,100)
Total Notification Remaining	0	0	0	0	0
<p>(a) Differences due to rounding.</p> <p>(b) Non-ignition risk notifications will be incorporated into the isolation zone bundles from 2023-2027.</p>					

3. How PG&E will integrate additional inspection findings into its prioritization.

PG&E's year-over-year find rate for ground inspections has steadily increased since 2019 by as much as 40 percent in one year. This find rate increase is driving the growth in our backlog of maintenance tags. Because of this increase to our backlog, we are making changes to how we look at inspection findings to ensure that we fully understand the issue that the inspection uncovered and that we are addressing it most appropriately. We are undertaking an analysis of our inspection findings and open maintenance tags created in 2022 that resulted in a failure. We are analyzing the information collected during the inspection and comparing it to the actual failure to understand if we collected the right and best information during the inspection. Based on the results of this analysis we will make adjustments to the types of inspections we conduct and the priority of the resulting maintenance tag.

For example, conducting a routine visual inspection of a pole can identify a deteriorated pole but may not provide enough information about the extent of the damage or condition of the pole. To get better information, we will conduct



a pole test and treat intrusive inspection that will enable us to make a more informed decision about how to address the pole damage and the priority of the work. In certain cases, an inspection may find that a maintenance tag is not the appropriate method for addressing the condition of an asset. For example, we have found certain splices (e.g., splices within two feet of an insulator, and number of splices per span) do not pose an increased risk of ignition. Instead of issuing a non-ignition risk maintenance tag, the splices are better addressed by the asset management team as they are a potential indicator of a holistic asset health issue.

The information from this analysis of inspection findings and failures will result in changes to the number and type of maintenance tags that are created.

4. *Resource allocation plans in order to timely close tags.*

[Table RN-PG&E-04-8](#) below shows PG&E’s current estimate of the minimum number of crew hours, capital costs, and expense amounts that it will require to timely close tags per our proposed plan.

PG&E will continue to look for ways to work more efficiently and address notifications in ways that will help us to reduce crew hours and costs.

**TABLE RN-PG&E-23-04-8:  
2023-2029 RESOURCE ESTIMATES**

<b>Year</b>	<b>Total Crew Hours (000s)</b>	<b>Estimated Capital Costs (\$Millions)</b>	<b>Estimated Expense Amounts (\$Millions)</b>
2023	1,400	\$575	\$65
2024	2,000	\$950	\$120
2025	2,000	\$950	\$120
2026	2,000	\$950	\$120
2027	1,800	\$900	\$100
2028	1,800	\$900	\$100
2029	1,800	\$900	\$100

## Critical Issue RN-PG&E-23-05

**Critical Issue Title:** *PG&E's undergrounding plan may leave wildfire risk unaddressed in highest risk areas.*

### Introduction

PG&E uses an integrated mitigation strategy to manage wildfire risk across our system while we implement permanent risk reduction strategies like undergrounding and other system hardening work. Accordingly, PG&E is not leaving wildfire risk unaddressed in high-risk areas in the short term.

PG&E's integrated strategy of Comprehensive Monitoring and Data Collection, Operational Mitigations, and System Resilience Mitigations is used to monitor, manage, and reduce wildfire risk in the highest risk areas in our service territory.<sup>20</sup> Our top priority when planning and scheduling mitigation initiatives is to ensure that we have built sufficient risk mitigation into the system through Comprehensive Monitoring and Data Collection and Operational Mitigations to keep our communities safe as we develop our long-term resilience programs.<sup>21</sup>

When our Comprehensive Monitoring and Data Collection initiatives indicate there is wildfire exposure that cannot be quickly addressed through our suite of long-term resilience initiatives, we identify and use interim mitigations within the Operational Mitigation category that have the potential to be deployed quickly to address the threat.<sup>22</sup> PG&E estimates that by the end of this WMP cycle, we will have reduced approximately 94 percent of wildfire risk in the HFTD/HRFA through a combination of permanent risk reduction (system resilience mitigations) and risk management initiatives (e.g., operational mitigations including EPSS and PSPS).<sup>23</sup>

To demonstrate the use of interim operational mitigations, PG&E has identified the 41 circuit segments on our system that contribute to the top five percent of cumulative (wildfire and PSPS) risk.<sup>24</sup> For each of these highest risk circuit segments, PG&E has described the combinations of mitigation initiatives that we are currently using, or will be using, to manage and reduce risk on each circuit segment during the 2023-2025 WMP cycle. While certain circuit segments are not scheduled for system hardening during this WMP cycle, we will monitor and manage wildfire risk using Comprehensive Monitoring and Data Collection and Operational Mitigations. Of the 41 highest-risk circuit segments, the 39 circuit segments owned by PG&E have been or will be included

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<sup>20</sup> 2023-2025 WMP, R1, Figure 7-1, p. 299.

<sup>21</sup> 2023-2025 WMP, R1, p. 257.

<sup>22</sup> 2023-2025 WMP, R1, p. 260.

<sup>23</sup> 2023-2025 WMP, R1, p. 260.

<sup>24</sup> 2023-2025 WMP, R1, Table 6-5, pp. 197-198.

in our system hardening program even if they are not scheduled for hardening before 2026.<sup>25</sup> More specifically:

- 4 circuit segments have already been hardened or are included in other system hardening programs (overhead hardening or line removal);
- 16 circuit segments will be undergrounded in 2023-2025;
- 19 circuit segments are planned for 2026 or later system hardening; and
- 2 circuit segments are privately owned and will not be hardened by PG&E.

In response to RN-PG&E-23-05, PG&E discusses our system hardening plans for the period 2023 through 2026, as opposed to the 2023-2025 WMP period. Because PG&E's Test Year 2023 General Rate Case (GRC) includes forecast costs and work covering the 2023-2026 period, we have aligned our 2023 GRC and 2023-2025 WMP system hardening plans by including 2026 in our WMP discussions and analysis. Additionally, Energy Safety requested undergrounding workplans through 2026 in ACI PG&E-22-16.

**Remedy a. Regarding Scaled-Back Targets:**

- Analysis on the remaining miles originally scoped for undergrounding in 2022 but now no longer scoped for undergrounding within PG&E's 2023-2025 plan. This should include risk-ranking of those miles, interim mitigations if these miles are scoped for undergrounding in the future, or alternative mitigations, particularly grid hardening, if the miles are no longer scoped for undergrounding.*

**Response to Critical Issue Remedy # a. i:**

PG&E's undergrounding plan submitted with the 2022 WMP was made-up of 332 circuit segments covering 3,920 miles (including buffer miles and other system hardening undergrounding work) for the years 2022-2026.<sup>26,27</sup> For purposes of this response, we refer to this workplan as the "2022 WMP Undergrounding Workplan."

PG&E's undergrounding plan submitted with the 2023-2025 WMP includes approximately 2,700 miles for the years 2023-2026. Within that total mileage, PG&E plans to install approximately 2,100 underground miles from 2023-2026.<sup>28,29</sup> The additional 600 miles in the workplan includes additional "buffer" miles should we

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<sup>25</sup> 2023-2025 WMP, R1, Table 7-4, pp. 308-314.

<sup>26</sup> 2022 WMP Update – Revised, July 26, 2022, Table RN-PG&E-22-03-02, p. 570.

<sup>27</sup> PG&E's 2022 Workplan is attachment 2202-07-26\_PGE\_22-04\_RNR\_R3\_Atch01\_Redacted.

<sup>28</sup> 2023-2025 WMP, R1, Table 8.1.2-2, p. 347.

<sup>29</sup> PG&E's 2023-2026 undergrounding workplan is Attachment 2023-03-07\_PGE\_2023\_WMP\_R0\_Appendix D\_ACI PG&E-22-16\_Atch01\_Redacted.

encounter unforeseen delays on certain projects.<sup>30</sup> For purposes of this response, we refer to this workplan as the “2023-2026 Undergrounding Workplan.”

Of the 332 circuit segments originally identified in the 2022 WMP Undergrounding Workplan:

- 193 circuit segments are also included in the 2023-2026 Undergrounding Workplan
- 139 circuit segments from the 2022 WMP Undergrounding Workplan are still included in PG&E’s system hardening plans in various ways, as shown in Attachment 2023-08-07\_PGE\_23-05\_RNR\_R0\_Atch01.<sup>31</sup> This includes the following:
  - 5 circuit segments were re-named after 2022 (in the Wildfire Distribution Risk Model (WDRM) v3) and the circuit segments are, in fact, included in the 2023-2026 Undergrounding Workplan;
  - 3 circuit segments are scheduled for other system hardening mitigation solutions (line removal or overhead hardening); and
  - 131 circuit segments are scheduled for undergrounding after 2026.

For convenience, below is a table identifying the 8 circuit segments that have either been renamed or scheduled for another system hardening mitigation solution.

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<sup>30</sup> 2023-2025 WMP, R1, p. 348 and Table 8.1.2-3, p. 349.

<sup>31</sup> Attachment 2023-08-07\_PGE\_23-05\_RNR\_R0\_Atch01 identifies: The WDRM v3 risk-ranking for the 131 excluded circuit segments and the interim mitigations and system hardening scheduled for each of the 131 excluded circuit segments has been provided in Attachment 2023-04-06\_PGE\_2023\_WMP\_R2\_Section 6.4.2\_Atch01.

**TABLE RN-PG&E-23-05-1:  
CIRCUIT SEGMENTS IN THE 2022 WMP UNDERGROUNDING WORKPLAN BUT NOT LISTED IN  
THE 2023-2026 UNDERGROUNDING WORKPLAN**

Line No.	Circuit Segment	Reason the Circuit Segment does not Appear on 2023-2025 WMP Undergrounding Workplan
1	DUNBAR 1101440	Circuit segment name changed to DUNBAR 110534. Included in the 2023-2025 WMP Undergrounding Workplan. <sup>(a)</sup>
2	DUNBAR 1103234	Circuit segment name changed to DUNBAR 1101CB. Included in the 2023-2025 WMP Undergrounding Workplan. <sup>(a)</sup>
3	DUNBAR 1103839384	Circuit segment name changed to DUNBAR 1101CB. Included in the 2023-2025 WMP Undergrounding Workplan. <sup>(a)</sup>
4	HALF MOON BAY 11036018	Circuit segment name changed to HALF MOON BAY 11036012. Included in the 2023-2025 WMP Undergrounding Workplan. <sup>(a)</sup>
5	WYANDOTTE 11031504	Circuit segment name changed to WYANDOTTE 1110980944. Included in 2023-2025 WMP Undergrounding Workplan. <sup>(a)</sup>
6	VOLTA 110111568	Scheduled for Line Removal.
7	BUELLTON 1102CB	Scheduled for Overhead Hardening (Covered Conductor).
8	POINT MORETTI 1101415734	Scheduled for Overhead Hardening (Covered Conductor).
<hr/> <p>(a) PG&amp;E often changes circuit segment names when additional segmenting devices are placed on the grid or other grid design changes such as switching occur.</p>		

*ii. A list of CPZs that PG&E is not scoping for undergrounding in its 2023-2025 plan due to feasibility constraints but that are included within the top 20 percent highest risk CPZs. For each of these CPZs, PG&E must provide its alternative mitigation or hardening plans.*

**Response to Critical Issue Remedy # a. ii:**

There are 720 circuit segments that currently make-up the top 20 percent of risk ranked circuit segments in PG&E's service territory. Of the top 20 percent risk ranked circuit segments:

- 153 are included in the 2023-2026 Undergrounding Workplan;
- 11 have already been hardened;<sup>32</sup>
- 477 are planned for undergrounding work after 2026; and
- 79 are not included in an undergrounding work plan and have not been hardened.

PG&E protects the 477 circuit segments that are planned for undergrounding after 2026 through our portfolio of Comprehensive Monitoring and Data Collection and Operational

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<sup>32</sup> Includes covered conductor and installation of a REFCL system.

Mitigations. Each circuit segment is protected by multiple mitigations such as aerial and ground asset inspections, pole and non-pole maintenance programs, vegetation management inspection, Downed Conductor Detection (DCD), pole clearing, EPSS, and PSPS. These layers of protection help to reduce wildfire risk across the system until a circuit segment is scheduled for undergrounding. PG&E provided a list of mitigations in place for each circuit segment in its WMP.<sup>33</sup>

There are 79 circuit segments that are not included in an underground plan and have not been hardened. In place of these circuit segments, PG&E chose to add different circuit segments to the portfolio that could be undergrounded more efficiently. PG&E manages wildfire risk on these 79 circuit segments through our portfolio of Comprehensive Monitoring and Data Collection and Operational Mitigations described above.

For additional context, PG&E has also analyzed the circuit segments that make-up the top 20 percent of risk ranked circuit segments (1) based on a ranking by WFE; and (2) based on a pure risk ranking. Approximately 87 percent of the circuit segments are in the top 20 percent of ranked segments and selected for undergrounding under both criteria. The circuit segments that are identified using both the WFE and risk rank methodology account for more than 90 percent of the miles in the undergrounding workplan and address 95 percent of the risk found in the top 20 percent risk ranked circuits.

For the remaining 13 percent of the portfolio, we have delayed undergrounding in those locations to maximize risk reduction for each dollar spent. Instead of undergrounding these circuit segments at this time based on the risk-rank methodology, PG&E determined that it would be more efficient to choose circuit segments based on the WFE score because undergrounding circuit segments with a lower feasibility score can be done more quickly with a lower cost. Please see the response to Critical Issue Remedy b. i for additional context.

**Remedy b. Regarding the mitigation selection decision-making process:**

*i. Justification for the use of WFE as opposed to standard cost-benefit analysis when comparing mitigations, particularly in regard to feasibility.*

**Response to Critical Issue Remedy # b. i:**

Using the WFE when Comparing Mitigations

PG&E used the WFE when comparing mitigations in the 2023-2025 WMP because it was the best method available at the time and it was part of the approved 2022 WMP. The risk output from the WDRM is the basis of the WFE calculation. Incorporating feasibility into the risk ranking calculation provides an enhanced understanding of risk reduction because the feasibility factor signals the time and cost required to implement the mitigation where terrain difficulty translates to a longer mitigation construction

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<sup>33</sup> Attachment 2023-04-06\_PGE\_2023\_WMP\_R2\_Section 6.4.2\_Atch01.

timeline. The longer the time to implement a mitigation the longer the time to reduce wildfire risk in that location.

When we consider feasibility at the portfolio level, PG&E balances high risk, harder-to-construct miles with miles that we can relocate more quickly so that risk reduction continues across the system. Incorporating feasibility into the risk reduction output from the WDRM allows us to balance reducing risk on the highest risk circuit segments with reducing risk across the HFTD. By completing miles more quickly, we take advantage of work execution and cost efficiencies and reduce risk more quickly.

Impacts to construction feasibility can be measured in terms of the increased time it takes to do an undergrounding project and the increased costs for that project. For example, it is more difficult for us to underground circuit segments located in mountainous terrain. Due to the hard rock, narrow winding roads, and elevation changes in mountainous terrain, we are at times unable to use traditional construction methods like a rock wheel for trenching. When we cannot use traditional trenching tools, we must resort to other methods such as backhoes, bobcats, and jackhammers to break through the hard rock. PG&E generally averages 100 to 300 feet per day of trenching using a rock wheel but if we must resort to backhoes and jackhammers, the average drops to approximately 20 to 30 feet per day of trenching. In other areas where we are undergrounding, we have encountered soil conditions consisting of very hard rock. While we are still able to use our traditional trenching methods, it takes from 1 to 3 weeks to complete a 250-foot boring run. In locations without hard rock, PG&E's contractors can complete a 900-foot boring run in 1 day. The additional time required to complete the undergrounding work due to the difficult terrain significantly increases construction costs. Addressing hard rock, steep terrain and water crossings can more than double the costs of construction. Considering feasibility when selecting certain undergrounding projects is reasonable. PG&E can complete more projects and reduce more risk on the system by completing work in less difficult terrain in the time it will take to complete certain difficult projects.

The two pictures below, [Figure RN-PG&E-23-05-1](#), are two views of a circuit segment on one of PG&E's undergrounding project sites. The picture on the left shows the steep gradient along the roadway. The picture on the right (overhead view) shows a creek on the other side of the roadway. Both the steep gradient and the adjacent waterway are terrain features that increase the complexity, time, and cost of an undergrounding project.

**FIGURE RN-PG&E-23-05-1:  
EXAMPLES OF TERRAIN FEATURES THAT IMPACT PROJECT FEASIBILITY**



On a final note, PG&E's mitigation selection process in the 2023-2025 WMP follows the Safety Model Assessment Proceedings (S-MAP) Settlement Agreement requirements.<sup>34</sup> The S-MAP Settlement Agreement requires utilities to calculate an RSE but says that the utility is not bound to select its mitigation based solely on RSE ranking but can consider other factors including execution considerations.<sup>35</sup> By relying on the WFE to justify mitigation selections in the WMP, PG&E incorporates the elements of an RSE (risk reduction and cost) along with execution considerations (terrain difficulties). Using the WFE is a reasonable approach for identifying where we can most efficiently reduce risk.

#### Addressing Energy Safety's Table 5: Top 20% WFE vs. Work Model Output

Energy Safety has stated that WFE-based risk ranking does not properly prioritize undergrounding based on highest wildfire risk.<sup>36</sup> The Revision Notice includes a table (Table 5 in Appendix A or "RN Table 5") that shows the number of miles and percent of mileage in the top 20 percent of risk ranked circuits. RN Table 5 in Appendix A is reproduced below ([Table RN-PG&E-23-05-2](#), Columns A through F).

The Revision Notice states that, "PG&E's 2023 through 2026 undergrounding workplan includes only 70 percent of undergrounding sites in the top 20 percent risk ranked circuits based on model output, as opposed to 87 percent in the top 20 percent WFE scores" and refers to RN Table 5 to support this conclusion.<sup>37</sup>

We believe this is a misunderstanding of PG&E's underground workplan addressing the high-risk locations. The breakdown of the 70 percent and 17 percent represents the selection of the project miles based on top risk criteria from the WDRM v2 (17 percent) and the WDRM v3 WFE (70 percent). The majority of miles (70 percent) on the

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<sup>34</sup> 2023-2025 WMP, R1, p. 241.

<sup>35</sup> D.18-12-014, Row 26.

<sup>36</sup> OEIS Issuance of Revision Notice for Pacific Gas and Electric Company's 2023-2025 Wildfire Mitigation Plan, June 22, 2023, p. 16. (Revision Notice).

<sup>37</sup> Revision Notice, p. 16 and Appendix A, Table 5.



2023-2026 workplan were selected using the most current risk model. The remaining miles are the in-flight projects selected using WDRM v2 (17 percent).

In [Table RN-PG&E-23-05-2](#) below, PG&E has added two columns to RN Table 5 (Columns G and H) where we sum the mileage in the top 20 percent from WDRM v2 and v3 (Column G) and sum the percent of portfolio in the top 20 percent from WDRM v2 and v3<sup>38</sup> (Column H). The table shows that the number of miles and percent of circuit segments in the top 20 percent of risk ranked circuit segments selected using both the WFE and the WDRM are the same.

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**38** Note, the WDRM v3 mileage in Columns C and D in [Table RN-PG&E-23-05-2](#) below include the feasibility factor. PG&E started incorporating feasibility into decision-making in WDRM v3 so only the WDRM v2 mileage excludes feasibility.

**TABLE RN-PG&E-23-05-2:  
PG&E'S UNDERGROUNDING WORKPLAN FOR TOP 20 percent WFE COMPARED TO RISK MODEL OUTPUT**

Line No.	Year	Mileage in Top 20% WFE <sup>(a)</sup>	Percent of Portfolio in Top 20% WFE <sup>(a)</sup>	Mileage in Top 20% WDRM v3 <sup>(b)</sup>	Percent of Portfolio in Top 20% WDRM v3 <sup>(b)</sup>	Mileage in Top 20% WDRM v2 <sup>(c)</sup>	Percent of Portfolio in Top 20% WDRM v2 <sup>(c)</sup>	Mileage in Top 20% WDRM v2 and V3	Percent of Portfolio in Top 20% WDRM v2 and v3
		A	B	C	D	E	F	G = C+E	H = D+F
1	2023	361	68%	40	7%	321	60%	361	67%
2	2024	458	78%	362	62%	97	16%	459	78%
3	2025	647	95%	614	90%	33	5%	647	95%
4	2026	879	100%	860	98%	19	2.1%	879	100%
5	Total <sup>(d)</sup>	2,346	87%	1,876	70%	470	17%	2,346	87%

(a) 2023-2025 WMP, R1, Table 8.1.2-3.

(b) WMP-Discovery2023\_DR\_OEIS\_008-Q002Atch01\_Redacted, Row 39.

(c) WMP-Discovery2023\_DR\_OEIS\_008-Q002Atch01\_Redacted, Row 24.

(d) Differences due to rounding.

- ii. *An updated estimation of risk reduction effectiveness for undergrounding accounting for the remaining risk associated with secondary and service lines.*

### **Response to Critical Issue Remedy # b. ii**

#### Updated Undergrounding Effectiveness Considering Secondary and Service Lines

Throughout our 2023-2025 WMP, we indicated that relocating existing overhead lines underground, ignition risk is reduced by approximately 99 percent. This figure was based on subject matter expertise. We tested the 99 percent figure by calculating the annual ignitions per one thousand miles using 2015-2021 historical CPUC-reportable ignitions and our analysis that showed the annual ignition rate per one thousand miles was 95 to 96 percent.<sup>39</sup> However, wildfire risk reduction as an ignition is different than wildfire frequency or consequence. No underground ignition in the data set resulted in a fire greater than 10 acres, further substantiating underground facilities represent an even lower wildfire risk than overhead facilities. As such, we determined that the CPUC-reportable ignition data information is consistent with subject matter expert estimations of 99 percent.

In response to Energy Safety's request in the Revision Notice, we have conducted a further evaluation of wildfire risk reduction effectiveness for undergrounding that specifically accounts for the remaining risk associated with secondary and service lines. PG&E developed a preliminary, updated mitigation effectiveness for undergrounding considering the residual risk from secondary and service lines by considering the likely effectiveness of a mitigation consisting of undergrounding the primary line plus overhead hardening secondary and service lines. We considered how effective this combined mitigation would be in mitigating a potential ignition by assessing its likely effectiveness against more than 2,200 outage combinations<sup>40</sup> (excluding planned outages, PSPS and EPSS outages) that occurred in PG&E's HFTD during wildfire season.

Based on our further evaluation, the preliminary, updated mitigation effectiveness for undergrounding, considering the residual risk from secondary and service lines, is approximately 97.7 percent compared to the 99 percent effectiveness PG&E currently uses in our mitigation selection process.<sup>41</sup>

As part of our undergrounding program, PG&E currently places underground both overhead distribution primary lines and those secondary and services lines that run parallel to the undergrounded primary lines because the parallel secondary and service lines can be placed in the same trench as the primary lines being undergrounded. As part of the 10,000 mile undergrounding program, PG&E overhead hardens the remaining overhead secondaries and services (or ensures they are already in compliance with PG&E's hardened overhead asset standard in high fire threat districts) by: (a) replacing any uncovered service or secondary lines with covered conductor; (b)

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<sup>39</sup> WMP-Discovery2023\_DR\_SPD\_003-Q004a.

<sup>40</sup> The analysis considered outages from 2015-2022.

<sup>41</sup> 2023-2025 WMP, R1, p. 343.

replacing any covered conductor of an aged material with less strength (also known as "gray services" due to the color of the protective cover) with new covered conductor; (c) removing any physical connections of the lines with trees and (d) adding breakaway connectors to allow for a safe, quick disconnection of power to service lines if a failure (like a tree falling into the line) occurs. PG&E will continue to evaluate when/how we underground secondaries and services in future years in response to feedback from Energy Safety, other stakeholders, and benchmarking with other utilities.

*iii. An updated analysis on any cost/benefit impacts for mitigation selection based on such updated undergrounding effectiveness calculation. This must include discussion of any changes in potential mitigation selection or project prioritization.*

### **Response to Critical Issue Remedy # b. iii:**

#### Updated Mitigation Selection Based on Updated Undergrounding Effectiveness Calculation

PG&E re-evaluated our mitigation selection based on the updated mitigation effectiveness calculation that takes into account the remaining risk associated with secondary and service lines. As discussed in response to Remedy b(ii), the updated mitigation effectiveness for undergrounding considering the residual risk from secondary and service lines is approximately 97.7 percent compared to the 99 percent effectiveness PG&E currently uses in our mitigation selection process.<sup>42</sup>

The change in mitigation effectiveness for undergrounding considering the residual risk from secondary and service lines is minor (1.3 percent less) and was not sufficient to change PG&E's mitigation selection. The two other system hardening mitigations PG&E considers are line removal with remote grid and covered conductor. Line removal with remote grid is our first choice for system hardening but can only be implemented under certain, select conditions.<sup>43</sup> The change in mitigation effectiveness does not impact where we would choose to implement line removal. The mitigation effectiveness for covered conductor is approximately 64 percent,<sup>44</sup> 33 percent less than the updated effectiveness for undergrounding considering the residual risk from secondary and service lines. Because the updated effectiveness from undergrounding is still 33.7 percent greater than the effectiveness from covered conductor PG&E is not changing its mitigation selection.

#### Cost-Benefit Analysis

PG&E understands that Energy Safety (and other parties) is interested in a more traditional cost/benefit approach to selecting mitigations. Remedy b(i) asks PG&E to justify the use of WFE as opposed to standard cost-benefit analysis and Remedy b(iii) asks for an updated analysis on any cost/benefit impacts for mitigation selection

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<sup>42</sup> 2023-2025 WMP, R1, p. 343.

<sup>43</sup> 2023-2025 WMP, R1, p. 372.

<sup>44</sup> 2023-2025 WMP, R1, ACI PG&E-22-11, p. 900.

based on such updated undergrounding effectiveness calculation including any changes in potential mitigation selection or project prioritization.

While the 2023-2025 WMP Guidelines do not require utilities to use a traditional cost/benefit approach in selecting its mitigations, Energy Safety recognized that in due course, the electrical corporation's risk mitigation identification procedure must align with results from the Risk-Based Decision-Making Framework OIR (RBDMF).<sup>45</sup> PG&E is required to assess and rank risks and mitigation using a cost/benefit approach starting with our 2024 RAMP submission.<sup>46</sup>

### Developing Benefit-Cost Analysis Tools

To comply with the new RBDMF requirements, PG&E is in the process of constructing a benefit/cost model that will incorporate several elements of the mitigation selection decision-making process into an analytical tool. PG&E plans to present the benefit/cost model and mitigation selection results using this model in our Senate Bill (SB) 884 plan that we intend to file with Energy Safety.

The Wildfire Benefit Cost Analysis tool will analyze the costs and quantifiable benefits of various mitigation alternatives at the circuit segment level and identify the preferred mitigation solution for each. For each mitigation alternative, PG&E will consider wildfire risk, electric reliability, public safety, and cost efficiencies.<sup>47</sup> At a minimum, the inputs into the benefit-cost model will include: updated mitigation effectiveness values; outage (reliability) effectiveness values; construction costs; operations and maintenance costs; and other factors in order to determine the cost/benefit of each mitigation or combination of mitigations at the circuit segment and portfolio level.

The benefit-cost framework is defined as:

$$\begin{aligned} & \textit{Net Benefit} \\ & = \textit{Monetized Risk Avoidance (Wildfire, Public Safety, Reliability, EPSS, PSPS)} \\ & - \textit{Cost (Initial Capital + Lifetime O\&M + Others)} \end{aligned}$$

The output from the benefit-cost model will include a table that shows the monetized value of each Wildfire Benefit Cost Analysis (WBCA) element at circuit segment level. [Table RN-PG&E-23-05-3](#) below is an example of the output from the WBCA model for two mitigation alternatives at two circuit segments. The preferred mitigation solution for each circuit is the mitigation is the one with the largest positive value. This indicates that the mitigation benefits—wildfire risk reduction, public safety, and improved

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<sup>45</sup> Office of Energy Infrastructure Safety, 2023-2025 Wildfire Mitigation Plan Guidelines, December 6, 2022, p. 63, Section 7.1.4.1, Identifying and Evaluating Mitigation Initiatives. The Risk-Based Decision-Making Framework OIR or "RBDMF" is Rulemaking (R.) 20-07-013.

<sup>46</sup> 2023-2025 WMP, R1, pp. 241-242.

<sup>47</sup> Financial concerns are represented by the value of a statistical life as required by the RBDMF Decision 22-12-027, Ordering Paragraph 1.

reliability—outweigh the mitigation costs, initial capital construction costs, long-term operations and maintenance, and self-insurance.

**TABLE RN-PG&E-23-05-3:  
EXAMPLE WCBA OUTPUT  
(MILLIONS OF DOLLARS)**

Line No.	Mitigation Alternative	PVRR Cap. Invest.	Lifetime O&M Costs	Monetized Risk Value						Risk Avoidance over Lifetime Benefit	Residual Risk over Lifetime	Lifetime – Benefit-Cost
				Wildfire	Public Safety	Normal Reliability	PSPS	EPSS	Total Risk			
		A	B							C		D = C-(A+B)
1	<u>Circuit Segment 1</u>											
2	Covered Conductor Rebuild with EPSS and DCD	\$30.96	\$18.91	\$2,531.09	\$0.47	\$4.36	\$0	\$8.05	\$2,543.97	\$1,899.69	\$644.27	\$1,849.82
3	UG Primary, OH Secondaries and Services	\$126.11	\$5.58	\$2,531.09	\$0.47	\$4.36	\$0	\$8.05	\$2,543.97	\$2,315.42	\$228.55	\$2,183.73
4	<u>Circuit Segment 2</u>											
5	Covered Conductor Rebuild with EPSS and DCD	\$46.19	\$26.12	\$55.02	\$0.81	\$73.43	\$3.57	\$74.97	\$207.80	\$116.18	\$91.62	\$43.86
6	UG Primary, OH Secondaries and Services	\$252.33	\$7.70	\$55.02	\$0.81	\$73.43	\$3.57	\$74.97	\$207.80	\$182.17	\$25.62	\$(77.86)

## Critical Issue RN-PG&E-23-06

**Critical Issue Title:** *PG&E does not provide targets for seven of its vegetation management inspection programs.*

**Remedy # 1:** *PG&E must provide projected targets for each year of the 2023-2025 WMP, quarterly, rolling targets for 2023 and 2024, and relevant units, in the format prescribed in the 2023-2025 WMP Technical Guidelines Table 8-15: Example of Vegetation Inspection Targets by Year, for each of the following vegetation management inspection programs:*

- *Routine Transmission – Ground;*
- *Transmission Second Patrol;*
- *Integrated Vegetation Management;*
- *Distribution Routine Patrol;*
- *Distribution Second Patrol;*
- *VM for Operational Mitigations; and*
- *Focused Tree Inspections.*

### Responses to Critical Issue Remedy # 1

In response to RN-PG&E-23-06, we have revised Tables 8-14 and 8-15 of PG&E's 2023-2025 WMP to include additional annual and quarterly targets for vegetation management initiatives described in the plan. These tables are presented in their entirety in the WMP. The additional targets are presented below in [Table RN-PG&E-23-06-1](#) and [RN-PG&E-23-06-2](#). [Table RN-PG&E-23-06-1](#) provides the annual target language and estimated percentage risk impact. [Table RN-PG&E-23-06-2](#) provides the rolling quarterly targets.

As explained in footnote (c) to [Table RN-PG&E-23-06-1](#), we have not provided a 2023 target for our VM for Operational Mitigations (VMOM) Program. This is a new program for 2023 stemming from the conclusion of the EVM Program. This program will help reduce outages and potential ignitions using a risk-informed, targeted plan to mitigate potential vegetation contacts based on historic vegetation outages on EPSS-enabled circuits. Currently, PG&E only has one full year of EPSS outage data, and we are still developing our VMOM inspection process. Accordingly, the extent of work necessary for this program in 2023 has not yet been fully determined. We anticipate, however, that the operational lessons learned from 2023 execution of the VMOM Program, combined with another full year of EPSS outage data, will support our conservative target estimate of mitigating 6,500 trees as part of this program in both 2024 and 2025.



**TABLE RN-PG&E-23-06-1:  
RISK REDUCTION AND METHOD OF VERIFICATION FOR SEVEN VEGETATION MANAGEMENT INSPECTION PROGRAMS**

Target Name	Initiative Activity Tracking ID	Reference Section	2023 Target & Unit	X% Risk Impact 2023	2024 Target & Unit	X% Risk Impact 2024	2025 Target & Unit	X% Risk Impact 2025	Method of Verification
Focused Tree Inspections (FTI)	VM-03	8.2.2.2.5	Complete focus tree inspections of 250 Circuit Miles in defined Areas of Concern (AOC) locations. <sup>(a)</sup>	<1%	Complete focus tree inspections of 1,800 Circuit Miles in defined Areas of Concern (AOC) locations.	<1%	Complete focus tree inspections of 1,800 Circuit Miles in defined Areas of Concern (AOC) locations.	<1%	Documentation of pilot program inspections in VM system of record.
Tree Removal Inventory (TRI)	VM-04	8.2.2.2.4	Mitigate <sup>(b)</sup> 15,000 trees identified from the legacy EVM Program.	<1%	Mitigate <sup>(b)</sup> 20,000 trees identified from the legacy EVM Program.	<1%	Mitigate <sup>(b)</sup> 25,000 trees identified from the legacy EVM Program.	<1%	Report from VM database reflecting hazard no longer present.
Routine Ground -Transmission	VM-13	8.2.2.1.1	Complete Routine Transmission Ground Inspection of 17,740 circuit miles as defined by Transmissions Routine LiDAR detection point data systemwide.	100% (Eyes-on-Risk) PG&E system	Complete Routine Transmission Ground Inspection of 17,740 circuit miles as defined by Transmissions Routine LiDAR detection point data systemwide.	100% (Eyes-on-Risk) PG&E system	Complete Routine Transmission Ground Inspection of 17,740 circuit miles as defined by Transmissions Routine LiDAR detection point data systemwide.	100% (Eyes-on-Risk) PG&E system	Report from VM database reflecting completed work.
Second Patrol – Transmission	VM-14	8.2.2.1.2	Complete Transmission Second Patrol Inspection of 5,625 circuit miles dependent on remote sensing (ORTHO Imagery).	100% (Eyes-on-Risk) HFTD / HFRA	Complete Transmission Second Patrol Inspection of 5,625 circuit miles dependent on remote sensing (ORTHO Imagery).	100% (Eyes-on-Risk) HFTD / HFRA	Complete Transmission Second Patrol Inspection of 5,625 circuit miles dependent on remote sensing (ORTHO Imagery).	100% (Eyes-on-Risk) HFTD / HFRA	Report from VM database reflecting completed work.

**TABLE RN-PG&E-23-06-1:  
RISK REDUCTION AND METHOD OF VERIFICATION FOR SEVEN VEGETATION MANAGEMENT INSPECTION PROGRAMS  
(CONTINUED)**

<b>Target Name</b>	<b>Initiative Activity Tracking ID</b>	<b>Reference Section</b>	<b>2023 Target &amp; Unit</b>	<b>X% Risk Impact 2023</b>	<b>2024 Target &amp; Unit</b>	<b>X% Risk Impact 2024</b>	<b>2025 Target &amp; Unit</b>	<b>X% Risk Impact 2025</b>	<b>Method of Verification</b>
Integrated Vegetation Management – Transmission	VM-15	8.2.2.1.3	Complete Integrated Vegetation Management and Fee Inspections of 11,194 acres ROW across the Transmission systemwide	<1%	Complete Integrated Vegetation Management and Fee Inspections of 6,504 acres ROW across the Transmission systemwide	TBD	Complete Integrated Vegetation Management and Fee Inspections of 6,504 acres ROW across the Transmission systemwide	TBD	Report from VM database reflecting completed work.
Routine Patrol – Distribution	VM-16	8.2.2.2.1	Complete Distribution Routine Annual Patrol Inspection of 79,000 overhead circuit miles system wide	<1%	Complete Distribution Routine Annual Patrol Inspection of 78,650 overhead circuit miles system wide	<1%	Complete Distribution Routine Annual Patrol Inspection of 78,200 overhead circuit miles system wide	<1%	Report from VM database reflecting completed work.
Second Patrol – Distribution	VM-17	8.2.2.2.2	Complete Distribution Second Patrol Inspection of 43,000 circuit miles that are in the following map layers FHSZ, WUI, SRA, FRA, HFTD, and HFRA locations.	<1%	Complete Distribution Second Patrol Inspection of 25,685 circuit miles in HFTD and HFRA locations.	<1%	Complete Distribution Second Patrol Inspection of 25,685 circuit miles in HFTD and HFRA locations.	<1%	Report from VM database reflecting completed work.

**TABLE RN-PG&E-23-06-1:  
RISK REDUCTION AND METHOD OF VERIFICATION FOR SEVEN VEGETATION MANAGEMENT INSPECTION PROGRAMS  
(CONTINUED)**

Target Name	Initiative Activity Tracking ID	Reference Section	2023 Target & Unit	X% Risk Impact 2023	2024 Target & Unit	X% Risk Impact 2024	2025 Target & Unit	X% Risk Impact 2025	Method of Verification
VM for Operational Mitigations (VMOM) <sup>(c)</sup>	VM-18	8.2.2.2.3	N/A	N/A	Mitigate 6,500 trees for VM for Operational Mitigations program, on EPSS capable circuits. This target will include the previous year's carry-over work and prescriptions resulting from pro-active patrols on EPSS circuits. Future workplans will be dependent on previous year's EPSS outage data analysis.	TBD	Mitigate 6,500 trees for VM for Operational Mitigations program, on EPSS capable circuits. This target will include the previous year's carry-over work and prescriptions resulting from pro-active patrols on EPSS circuits. Future workplans will be dependent on previous year's EPSS outage data analysis.	TBD	Report from VM database reflecting completed work.

(a) See PG&E's response to [Critical Issue RN-PG&E-23-07](#), Remedy (b).

(b) We note that for purposes of Target VM-04, the term "Mitigate" is intended to refer to a tree identified from the legacy EVM Program that is either: (1) removed by the TRI program; (2) removed by another PG&E VM program and no longer present; or (3) no longer poses a threat to PG&E facilities because the facilities have been relocated.

(c) PG&E has not included a 2023 target for the VMOM Program. This is a new program for 2023 stemming from the conclusion of the EVM Program. This program will help reduce outages and potential ignitions using a risk-informed, targeted plan to mitigate potential vegetation contacts based on historic vegetation outages on EPSS-enabled circuits. Currently, PG&E only has one full year of EPSS outage data, and we are still developing our VMOM inspection process. Accordingly, the extent of work necessary for this program in 2023 has not yet been fully determined. We anticipate, however, that the operational lessons learned from 2023 execution of the VMOM Program, combined with another full year of EPSS outage data, will support our conservative target estimate of mitigating 6,500 trees as part of this program in both 2024 and 2025.

In 2023, we will also work to establish a process to avoid any double counting of trees worked as part of the VMOM Program in 2024 and 2025 that may also be identified for work in connection with our TRI Program. No double counting will take place in 2023 because VMOM does not have an annual target.

**TABLE RN-PG&E-23-06-2:  
QUARTERLY TARGETS FOR EIGHT VEGETATION MANAGEMENT INSPECTION PROGRAMS**

Target Name	Initiative Activity Tracking ID	Reference Section	Target End of Q2 2023 & Unit	Target End of Q3 2023 & Unit	End of Year Target 2023 & Unit	Target End of Q2 2024 & Unit	Target End of Q3 2024 & Unit	End of Year Target 2024 & Unit	End of Year Target 2025 & Unit
Focused Tree Inspections (FTI) <sup>(a)</sup>	VM-03	8.2.2.2.5	0 Circuit Miles	0 Circuit Miles	250 Circuit Miles	600 Circuit Miles	1,350 Circuit Miles	1,800 Circuit Miles	1,800 Circuit Miles
Tree Removal Inventory (TRI) <sup>(b)</sup>	VM-04	8.2.2.2.4	0 Trees	0 Trees	15,000 Trees	6,200 Trees	14,000 Trees	20,000 Trees	25,000 Trees
Routine Ground – Transmission	VM-13	8.2.2.1.1	16,396 Circuit Miles	17,738 Circuit Miles	17,740 Circuit Miles	16,396 Circuit Miles	17,738 Circuit Miles	17,740 Circuit Miles	17,740 Circuit Miles
Second Patrol – Transmission <sup>(c)</sup>	VM-14	8.2.2.1.2	0 Circuit Miles	0 Circuit Miles	5,625 Circuit Miles	0 Circuit Miles	0 Circuit Miles	5,625 Circuit Miles	5,625 Circuit Miles
Integrated Vegetation Management – Transmission	VM-15	8.2.2.1.3	11,151 Acres	11,194 Acres	11,194 Acres	2,590 Acres	5,690 Acres	6,504 Acres	6,504 Acres
Routine Patrol – Distribution	VM-16	8.2.2.2.1	41,761 Circuit Miles	61,806 Circuit Miles	79,000 Circuit Miles	39,325 Circuit Miles	58,988 Circuit Miles	78,650 Circuit Miles	78,200 Circuit Miles
Second Patrol – Distribution	VM-17	8.2.2.2.2	18,904 Circuit Miles	30,952 Circuit Miles	43,000 Circuit Miles	11,831 Circuit Miles	17,947 Circuit Miles	25,685 Circuit Miles	25,685 Circuit Miles
VM for Operational Mitigations <sup>(d)</sup>	VM-18	8.2.2.2.3	0 Trees	0 Trees	0 Trees	3,000 Trees	5,000 Trees	6,500 Trees	6,500 Trees

- (a) The FTI Program is a new pilot that began in Q2 2023 and stems from the conclusion of the EVM Program. In response to this Revision Notice, we have modified our 2023-2025 WMP to include a target associated with this pilot program. Given the program's late start in the year, as well as our limited operational experience executing this program, we have only provided an annual target ending in quarter four for this new program. As shown above, conservative estimates for rolling, quarterly targets in 2024 and an annual target in 2025 have been provided.
- (b) The TRI Program is a new program stemming from the conclusion of the EVM Program. As indicated in the 2023-2025 WMP, we are still developing our inspection process. Given our limited operational experience executing this program, we have only provided an annual target ending in quarter four for this new program. As shown above, conservative estimates for rolling, quarterly targets in 2024 and an annual target in 2025 have been provided.
- (c) The Second Patrol – Transmission target is all included in quarter four because that is when the LiDAR work takes place in the HFTD each year.
- (d) As noted in [Table RN-PG&E-23-06-1](#), PG&E has not included a 2023 target for the VMOM Program. Please see footnote (c) in that table for additional information. As shown above, conservative, estimated rolling quarterly targets have been provided for 2024 and an annual target for 2025.

**Remedy # 2:** PG&E must retain existing targets reported in its 2023-2025 WMP, dated March 27, 2023. For inspection programs with existing end-of-year targets but not the quarterly, rolling targets (i.e., Tree Removal Inventory), PG&E must provide quarterly, rolling targets for 2023 and 2024 without modifying its end-of-year targets.

## **Responses to Critical Issue Remedy # 2**

As shown in Table 8-15, PG&E has provided quarterly rolling targets in 2023-2025 for the five, previously existing vegetation management programs identified in this Revision Notice Critical Issue.

PG&E has provided annual targets ending in quarter four, 2023 for the new FTI and TRI vegetation management programs. As noted in footnotes (a) and (b) of [Table RN-PG&E-23-06-2](#) above, only annual targets are provided in 2023 for these VM programs. The FTI Program is a new pilot that began in Q2 2023 and stems from the conclusion of the EVM Program. In response to this Revision Notice, we have modified our 2023-2025 WMP to include a target associated with this pilot program. Given the program's late start in the year, as well as our limited operational experience executing this program, we have only provided an annual target ending in quarter four for this new program. The TRI Program is also a new program stemming from the conclusion of the EVM Program. As indicated in the 2023-2025 WMP, we are still developing our inspection process. Given our limited operational experience executing this program, we have only provided an annual target ending in quarter four for this new program. As shown above, conservative estimates for rolling, quarterly targets in 2024 and annual targets in 2025 for both programs have been provided.

As explained in response to Remedy #1, and in footnote (c) to [Table RN-PG&E-23-06-1](#) above, PG&E has not provided a 2023 target for the VMOM Program. However, conservative, estimated rolling quarterly targets have been provided for 2024 and 2025, where required.

We also note that we have retained existing quarterly and annual targets for the following VM inspection programs reported in our original 2023-2025 WMP:

- Routine Transmission (LiDAR Data Collection): VM-01
- Substation Defensible Space Inspections: VM-05 (Distribution), VM-06 (Transmission), and VM-07 (Hydroelectric Substations and Powerhouses)
- Pole Clearing Program: VM-02

Targets for these three VM inspection programs are not specifically reiterated in this Remedy, but they are still included in the final 2023-2025 WMP.

## **Critical Issue RN-PG&E-23-07**

**Critical Issue Title:** *PG&E does not adequately address its risk from hazard trees.*

*PG&E must revise its 2023-2025 WMP to detail how it will manage risk from hazard and resilience, effectively address the vegetation-caused ignition risk that exists in PG&E's service territory, and demonstrate a clear action plan to continue reducing utility-related ignitions attributable to contact from vegetation. This must include:*

**Remedy a.** *A clear description in the WMP and evidence of direction to inspectors under the Distribution Routine Patrol, Distribution Second Patrol, Tree Removal Inventory, and Focused Tree Inspections programs as to what factors and circumstances trigger a Level 2 (360-degree) inspection of an overstrike tree. PG&E may prescribe different factors and circumstances for each program. While PG&E should not rely solely on inspector judgement, PG&E should consider, in addition to these factors and circumstances, allowing an inspector to perform a Level 2 inspection whenever they deem it prudent and/or necessary.*

### **Response to Critical Issue Remedy a:**

#### Introduction

PG&E's guidance documents for Vegetation Management (VM) inspectors clearly instruct inspectors when to perform 360-degree, Level 2 inspections of overstrike trees. Inspectors working on the Routine Distribution, Distribution Second Patrol, Tree Removal Inventory, and Focused Tree Inspections programs are required to follow the procedures for when and how to conduct a Level 2 inspection that are set forth in the Distribution Inspection Procedures (DIP) and relevant attachments, as explained in more detail below.

PG&E revised our Vegetation Management Distribution Inspection Procedures in their entirety in 2023. The final Distribution Inspection Procedure (DIP) document was published on April 20, 2023 and was effective as of June 20, 2023, after PG&E submitted our 2023 WMP. In Appendix E of the 2023-2025 WMP, we are providing access to the DIP procedure, the DIP standard, and all the attachments to the DIP:

- Vegetation Management Distribution Inspection Procedure, TD-7102-01;
- Strategies to Manage and Reduce Palms, TD-7102P-Att01;
- EVM WMP Commitments, TD-7102P-Att02;
- Identifying Major Woody Stems, TD-7102P-Att03;
- Handling Stump Resprouts, TD-7102P-Att04;
- Bi-Annual Tree Management and Reduction Strategy, TD-7102P-Att05;
- Tree Removal Inventory Program, TD-7102P-Att06;
- Focused Tree Inspection Procedures, TD-7102P-Att07;

- Vegetation Management Operational Mitigation Procedure, TD-7102P-Att08;
- Vegetation Management Program, TD-7102S; and
- Vegetation Management Post Wildfire Standard, TD-7114S.

The DIP outlines the tasks necessary to fulfill the inspection requirements of the Distribution Vegetation Management Program. The objective of the program is to inspect vegetation around PG&E’s overhead electric distribution lines and facilities to maintain safe and reliable operation.<sup>48</sup> The DIP also includes a series of eight attachments that provide information specific to different elements of the Routine Distribution Inspection Program, as well as information about PG&E’s three new distribution inspection programs.<sup>49</sup>

The DIP provides guidance to vegetation inspectors about the factors and circumstances that trigger a Level 2 inspection and describes what a Level 2 inspection requires. The DIP explains:

IF (while performing the Level 1 inspection) the VMI [Vegetation Management Inspector] identifies a tree or trees with conditions found in the Hazard Trees/Vegetation Clearance section of the “California Power Line Fire Prevention Field Guide” (see Appendix B, Overview of Tree Defects and Site Conditions)<sup>50</sup>  
OR, if the VMI suspects a tree may have one or more of those conditions,  
THEN PERFORM a Level 2 assessment of that tree.<sup>51</sup>

Thus, a Level 2 inspection may be triggered by the identification of conditions listed in Appendix B of the DIP or at the inspector’s discretion if it is suspected that any of the conditions listed in Appendix B may exist that increase the likelihood of tree failure.

The DIP provides clear guidance as to what a Level 2 inspection must include:

Basic Assessment (Level 2): A detailed visual inspection of a tree and surrounding site that may include the use of simple tools. It requires that a tree risk assessor inspect completely around the tree trunk looking at the visible above ground roots,

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<sup>48</sup> Distribution Inspection Procedures, p. 1.

<sup>49</sup> Distribution Inspection Procedures, Attachments 01-08.

<sup>50</sup> Appendix B of the Distribution Inspection Procedures is the “Overview of Tree Defects and Site Conditions.” It provides information on tree defects and site conditions that increase the likelihood of tree failure, as well as items to be aware of when assessing for heart/butt rot. Examples of tree defects include broken and/or hanging branches, insect infestation, and fire damage.

<sup>51</sup> Distribution Inspection Procedures, p. 6.

trunk, branches, and site. Level 2 inspections are ground-based.<sup>52</sup> PG&E may not have rights to allow for removal of the tree(s).<sup>53</sup>

**Remedy b.** *A plan to fully implement (beyond the pilot) and mature Focused Tree Inspections during the WMP cycle, including defined milestones and a timeline for achieving those milestones. As part of this plan PG&E must include how and when it will update the Areas of Concern (e.g., recalculating inclusion criteria across the HFTD) and mature their development (e.g., adding soil type and stand density as risk factors).*

### **Response to Critical Issue Remedy b:**

#### FTI Implementation Plan

PG&E has developed a preliminary plan to fully implement and mature our Focused Tree Inspection Program. This preliminary plan will be updated and refined as we incorporate the learnings from the FTI pilot project and subsequent phases of the FTI Program.

PG&E anticipates that we will finish the pilot phase of the FTI Program in Q3 2023 and incorporate the learnings and information from the pilot into the broader VM framework. Currently, the plan for conducting FTI inspections, reviewing data and incorporating lessons learned into future program phases, and updating the AOCs is as shown in [Table RN-PG&E-23-07-1](#) below.

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<sup>52</sup> Distribution Inspection Procedures, p. 11.

<sup>53</sup> Distribution Inspection Procedures, Attachment 05, p. 1.



**TABLE RN-PG&E-23-07-1:  
PLANNED FTI SCHEDULE OF ACTIVITIES 2023-2025**

Schedule	Activity
Q2 2023	Implement pilot program in 4 AOCs <sup>(a)</sup> covering approximately 250 circuit segment miles <sup>(b)</sup> (in progress). We have completed 201 miles as of June 30.
Q3 and Q4 2023	Evaluate learnings from pilot program and incorporate into 2024 FTI Program.  This will entail making sure there is an updated FTI procedure to guide the VMI and further incorporating the FTI into OneVM.
2024	Conduct Focused Tree Inspections in AOCs covering approximately 1,800 circuit segment miles.
2024	Re-evaluate AOCs based on emerging data. Update to incorporate new data where appropriate.
Q3 and Q4 2024	Evaluate learnings from 2024 program and incorporate into 2025 FTI plans.
2025	Conduct Focused Tree Inspections in AOCs covering approximately 1,800 circuit segment miles.
Q3 and Q4 2025	Re-evaluate AOCs based on emerging data. Update to incorporate new data where appropriate.
2025	Evaluate learnings from pilot program and incorporate into 2026 FTI plans.
<p>(a) The 2023 pilot program will take place in four AOCs: 1) North Coast Napa_AOC_03; 2) Sierra El Dorado_AOC_02; 3) North Valley Butte_AOC_02; and 4) Central Valley Calaveras_AOC_04.</p> <p>(b) PG&amp;E's target for the 2023 FTI pilot program is 250 miles (VM-03). To the extent that there are opportunities to do additional miles in 2023, PG&amp;E will do so.</p>	

When we transition from the pilot project and fully implement FTI, we will refine our processes, inspection protocols, and tools and will share best practices from the pilot to all the AOCs. PG&E developed and published an FTI inspection procedure that was effective in May 2023. We anticipate transitioning from the 250 miles conducted in 2023 during the pilot program phase to 1,800 miles per year starting in 2024 when we begin implementing the full FTI Program.

Ultimately, PG&E plans to incorporate elements of FTI into the existing Annual and Second Patrol programs. By incorporating elements of FTI into the existing VM distribution inspection programs, we will be taking advantage of the improved situational awareness we use to develop and implement our FTI Program.

#### Updating Areas of Concern (AOC)

PG&E's AOCs are risk-informed and were developed using a wide range of data. Initial 2022 AOCs incorporated meteorology data by analyzing 30-years of lookback meteorology data and PSPS lookback polygons. We included vegetation data including outage clusters 2018-2022, PSPS vegetation damage locations 2020-2021, and vegetation caused ignitions 2014-2021. We incorporated reviews of additional areas outside of the HFTD and HFRA that are subject to EPSS under certain conditions.

Along with the quantitative data used to develop the AOCs, they were further evaluated by Public Safety Specialists and a regional review of second patrol areas by Vegetation Management SMEs. Finally, the AOCs were ranked according to the Wildfire Distribution Risk Model version 3 (WDRM v3) probability of ignition score.

PG&E will annually update the AOCs based on emerging data, models, and other technology. In 2023, PG&E will update the AOCs by adding 2023 satellite analysis data that shows vegetation canopy height, percentage of vegetation canopy cover, potential strike tree locations, and the percentage of dead tree cover across PG&E’s service territory. The high-resolution satellite data will augment the existing LiDAR data, and PG&E will work to incorporate new LiDAR data into AOC development as post-processed data becomes available. Additionally, the circuit configuration types will be added as an AOC layer, as 3-wire circuits have Downed Conductor Detection, which cannot be deployed on 4-wire circuits. Since DCD provides an additional layer of protection catching high impedance faults, the 4-wire circuits in AOCs will be high priorities for the FTI Program.

AOC reviews that will support 2024 planning will begin in August 2023 and conclude in November 2023 to inform revised prioritization and workplan finalization for the FTI Program. PG&E will also monitor AOCs for mitigation effectiveness by closely monitoring vegetation caused outages and ignitions throughout the WMP cycle to inform potential adjustments to the scope of the FTI Program. PG&E’s WMP Objective VM-11 is a commitment to enhance and refine the FTI AOC development criteria and application of the AOCs to vegetation management programs for the next ten years.

**Remedy c.** *Commitment to quantitative targets for Focused Tree Inspections during the WMP cycle (see RN-PG&E-23-06, above). If PG&E commits to performing Focused Tree Inspections on fewer circuit miles than are currently encompassed by the Areas of Concern (4,812 circuit miles) by the end of 2024, it must justify why it has chosen to do so and how it will prioritize certain Areas of Concern for inspection over others.*

**Response to Critical Issue Remedy c:**

PG&E has established the following targets for our FTI Program.

**TABLE RN-PG&E-23-07-2:  
FTI PROGRAM TARGET 2023-2025**

Target Name	Initiative Activity Tracking ID	Reference Section	2023 Target & Unit	X% Risk Impact 2023	2024 Target & Unit	X% Risk Impact 2024	2025 Target & Unit	X% Risk Impact 2025	Method of Verification
FTI	VM-03, VM-11	8.2.2.2.5	250 miles	<1%	1,800 miles	<1%	1,800 miles	<1%	Completed inspections in AOC

PG&E is currently targeting 2,050 miles of Focused Tree Inspection (FTI) in Areas of Concern by the end of 2024 (a 250-mile pilot in 2023 transitioning to 1,800 miles in 2024). We are performing fewer miles than are encompassed by the AOCs (4,812

miles) because this program is designed to target the areas that pose the highest vegetation risk for the coming wildfire season. The selection of locations within the AOC is driven by the factors explained in the response to Remedy b above. The program is not meant to cover the entire AOC every year but to focus on the highest risk miles within the identified AOC, and as further layers of information are brought into the AOC footprint, we may expand to complete the entire AOC within a given year. The prioritization of the locations for work each year will be driven preliminary by the most current Wildfire Distribution Risk Model, using Vegetation Failure for the Probability of Ignition. We will use lessons learned from 2023 pilot to revise/update the AOCs and corresponding FTI.

***Remedy d. An inspection procedure for Focused Tree Inspections:***

**Response to Critical Issue Remedy d:**

PG&E has developed an inspection procedure for performing the pilot for FTI. It is Utility Procedure: TD-7102P-01-Att07. The FTI procedure was published and was effective on May 22, 2023 and will be reevaluated once the pilot is complete.

***Remedy e. Justification as to why PG&E does not plan to perform regularly scheduled detailed inspections (as opposed to patrols), inclusive of Level 2, of overstrike trees adjacent to overhead circuit miles in the HFTD outside of Areas of Concern using TRAQ qualified ISA arborists.***

**Response to Critical Issue Remedy e:**

Regularly Scheduled Detailed Inspections

PG&E does perform regularly scheduled detailed inspections, inclusive of Level 2 inspections of overstrike trees adjacent to overhead circuit miles in the HFTD outside the Areas of Concern, as part of the Routine Distribution Inspection and Distribution Second Patrol.

PG&E inspects the overhead circuit miles in the HFTD two times per year under the Routine Distribution Inspection and Second Patrol Programs (see Vegetation Management DIP, Utility Procedure TD-7102P-01). If any of the tree characteristics listed in Appendix B of the DIP are observed, or when a VMI suspects that those conditions may exist, then a Level 2 assessment is performed on that tree.

Tree Risk Assessment Qualification (TRAQ) Qualified ISA Arborists

PG&E does not require that our VMI be TRAQ qualified to perform a Level 2 inspection under the Routine Distribution Inspection and Second Patrol Programs. The VMIs that conduct PG&E's routine and second patrol inspections are well qualified through arboricultural experience and PG&E's vegetation management inspection training program. PG&E's training program provides instruction in tools and procedures, tree

strike potential, abnormal field conditions and other relevant pre-inspection and inspection topics.<sup>54</sup>

PG&E has also instituted a Field Quality Control Program (FQC) that provides an additional layer of review for the VM programs. The FQC team observes VMIs performing Routine and Second Patrol inspections. The FQC team performs side-by-side observations of employees and contractors who perform vegetation work. The FQC observers evaluate whether work methods align with PG&E's standards and procedures. Observing work in real time allows PG&E to focus on improving the quality of work in the field and improving the knowledge and skills of the people performing it.<sup>55</sup> FQC performs active observations targeting approximately 90 percent of individuals meeting eligibility criteria as described in Table 8-18-3 of the VM Field QC Metrics Report.<sup>56</sup>

We note that there are insufficient TRAQ qualified inspectors to perform the system-wide inspections that are in scope for PG&E's Routine Distribution Inspection and Second Patrol programs. In addition, TRAQ certification is not required per PG&E's union agreement. At the same time, PG&E recognizes the benefits of TRAQ and has continued to proactively sponsor TRAQ training sessions. PG&E has also updated the letter agreement with the union to provide financial incentives to inspectors who become TRAQ qualified.

***Remedy f. Benchmarking with SCE (Southern California Edison) and SDG&E (San Diego Gas & Electric) with respect to hazard tree mitigation practices. PG&E then must report in its Revision Notice Response on the similarities and differences between the three electrical corporations' hazard tree mitigation practices. Where these practices differ, PG&E must explain why its practices differ from those of its peers. PG&E must also describe any changes it plans to make because of this exercise and a timeline to implement those changes.***

#### **Response to Critical Issue Remedy f:**

PG&E benchmarked with Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E) to learn about their hazard tree mitigation practices. The objective of the benchmarking was to gain a better understanding of identifying where there were similarities and differences among the three electric corporations' hazard tree mitigation practices. In the sections below, we describe PG&E, SCE, and SDG&E's hazard tree mitigation practice, describe any differences, and discuss whether PG&E proposes potential changes to our VM programs as result of the benchmarking.

PG&E met with SCE and SDG&E senior vegetation management personnel on separate conference calls on July 7, 2023. The discussion included the hazard tree practices for both distribution and transmission. The following topics were discussed during the benchmarking and are discussed in more detail below:

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<sup>54</sup> PG&E's 2023-2025 WMP, R1, Section 8.2.7.1.

<sup>55</sup> PG&E's 2023-2025 WMP, R1, p. 553.

<sup>56</sup> PG&E's 2023-2025 WMP, R1, p. 553.

- 1) Program Structure;
- 2) Geographic Coverage of Programs;
- 3) Inspection Cycle;
- 4) Guidance Documents and Tools;
- 5) Workforce Structure;
- 6) Level of Inspection;
- 7) Inspection Process;
- 8) Work Cycle (time from inspection to work completion);
- 9) Quality Control; and
- 10) Leveraging Technology.

### **1. Program Structure**

Table [RN-PG&E23-07-3](#) below summarizes the distribution and transmission program structure for each of the three utilities.

**TABLE RN-PG&E-23-07-3:  
PROGRAM STRUCTURE PG&E, SCE, AND SDG&E**

	PG&E		SCE		SDG&E	
	Program	Description	Program	Description	Program	Description
System	Routine	Annual compliance inspections and trimming. Identify dead, dying, and declining trees that may fail.	Routine	Annual compliance inspections and trimming.	Detailed Inspection	Annual compliance inspections and trimming.
	Second Patrol	Patrols six months offset from routine patrol to maintain clearances and to identify dead, dying, and declining trees in the HFTD.	Cycle Buster	Patrol that occurs on a 6-month cycle to identify vegetation that will not remain in compliance until the next annual inspection and identify hazard trees in HFRA.	Off-Cycle Patrol	Second annual inspection activity in the HFTD. Similar to Detailed Inspection Program but focused on HFTD. Additional, off-cycle patrols are also performed for Century plant and bamboo.
	Focused Tree Inventory	Focused inspections in Areas of Concern to address areas that have experienced higher volumes of vegetation damage.	Dead and Dying Tree Program	Patrol and identify dead and dying trees for removal.		
	Vegetation Management for Operational Mitigations	Reduce outages and ignitions based on historic outage information.	Hazard Tree Program	Asses live trees posing a fall-in risk.		
	Tree Removal Inventory	Work down trees identified by the legacy Enhanced VM Program.				
Transmission	Routine	Routine NERC and Non-NERC inspection cycle including LiDAR inspection and ground patrol.	Same as Distribution programs		Same as Distribution programs	
	Second Patrol	Aerial LiDAR inspection to assess tree growth.				

## Similarities

Overall, the electrical corporations are similar in how their vegetation management programs are structured.

- They each have an annual routine inspection activity that identifies vegetation to be trimmed or removed to maintain radial clearance requirements as well as identification of hazard trees.
- They each also have a second patrol that occurs within the HFTD referred to as Second Patrol, Cycle Buster, and Off-Cycle Patrol, which is focused on identifying and mitigating vegetation that could encroach upon radial compliance clearance distances before the next annual routine cycle as well as hazard trees identification and mitigation.
- Each electric corporation focuses its Second Patrol, Cycle Buster, and Off-Cycle Patrol activities within HFTD.
- The electrical corporations are aligned in working to consolidate their inspection programs. For example, SDG&E conducts detailed inspections for radial clearance requirements as well as hazard tree assessments at the same time. SCE now conducts Hazard Tree and Dead and Dying Tree programs at the same time as their Routine Program to reduce the number of site visits and gain operational efficiencies.

## Differences

The difference between PG&E and the other electric utilities is the separation between distribution and transmission programs. PG&E keeps our programs separate whereas SCE and SDG&E do not. PG&E keeps our programs separate for several reasons, set forth below.

- PG&E's transmission system size, approximately 18,000 miles, includes multiple ecological regions and jurisdictional boundaries which makes it advantageous for us to manage it as its own program.
- PG&E's Routine and Second Patrol transmission programs use LiDAR followed by a ground patrol based on the LiDAR findings for the inspection. This is different from the inspections by foot that are performed on the distribution system. This difference requires different procedures, planning, and work execution, which is best managed under a separate program.
- Certain transmission lines are subject to NERC requirements and because of the timing when the work must be completed and the difference in scope requirements, it is operationally more efficient to have transmission programs separate from distribution.

## Proposed Changes

PG&E is proposing changes in this area based on the benchmarking with SCE and SDG&E. All proposed changes to our VM programs are included in the “Proposed Changes Based on Benchmarking” section following our discussion of the 10 program topics.

### **2. Geographic Coverage of Programs**

All three electrical corporations are similar in that they have different hazard tree mitigation practices in HFTD and Non-HFTD areas. SCE distinguishes between HFRA and non-HFRA in its programs, but their HFRA encompasses all HFTD.

## Proposed Changes

PG&E does not plan to make any changes to our geographic coverage of programs following benchmarking with SCE and SDG&E. There are no appreciable differences among the three utilities in this area.

### **3. Inspection Cycle**

#### Similarities

The three electrical corporations are similar in terms of inspection cycles in the non-HFTD areas. In the non-HFTD, all three utilities conduct an annual inspection that consists of a Level 1 inspection and, when a hazard tree is observed, the utilities conduct a Level 2 inspection. Each electric corporation also conducts a second inspection in the HFTD.

#### Differences

The difference among the three electrical corporations is the inspection cycle and type of inspection in HFTD. We discuss inspection cycle here and level of inspection in Section 6.

#### PG&E:

- Performs an annual routine, Level 1 inspection in the HFTD. A Level 2 inspection is conducted when specific tree characteristics are observed.
- FTI is a pilot program. PG&E will continue to revise the program scope and cycle based on findings from the prior year inspections and information from meteorology, outage, and ignition data.
- The VMOM inspection cycle is based on outage history from EPSS enabled CPZs.
- TRI is a one-time program to remove the remaining inventory from the Enhanced VM (EVM) Program.

SCE applies its Tree Risk Index (TRI) strategy to its Hazard Tree Program (HTP). SCE uses four risk categories, A, B, C, and D, with A being the highest risk. SCE inspects TRI A areas annually and B, C, and D areas once every three years.



SDG&E performs an annual detailed inspection consisting of a Level 2 inspection of all its strike trees located in the HFTD. The Off-Cycle Patrol Program also consists of a Level 2 inspection of all strike trees located in the HFTD.

All three utilities conduct an annual patrol across their service territory and an annual second patrol in the HFTD/HFRA. PG&E also conducts additional inspections due to the composition of our inspection programs.

### Proposed Changes

PG&E is proposing changes in this area based on the benchmarking with SCE and SDG&E. All proposed changes to our VM programs are included in the “Proposed Changes Based on Benchmarking” section following our discussion of the 10 program topics.

## **4. Guidance Documents and Tools**

### Similarities

Each electrical corporation has governing documents that set forth the details about the scope of work for their hazard tree mitigation practices. There are similarities related to the tree characteristics that lead to it being classified as a hazard. For example, dead trees are treated the same by each utility regardless of the assessment tool used. If the dead tree has strike potential, then the tree will be mitigated.

### Differences

The difference between the electrical corporations are the tools that are used to record tree observations and when they are used.

PG&E uses the TRAQ Basic Tree Risk Assessment form for the FTI and TRI programs. PG&E does not use an assessment tool as part of our other programs. PG&E uses the Basic Tree Assessment form because TRAQ is an industry accepted methodology for tree risk assessment and requires industry recognized standardized training and qualification program for the inspectors that use it. Please refer to Remedy g of this Revision Notice response for a more detailed description of the TRAQ.

SCE uses its tree risk calculator to assess green trees in HFRA that have strike potential. For dead trees, meaning trees with 80 percent of the tree canopy dead, there is no specific tool used as those trees will be listed for mitigation.

SCE’s Tree Risk Calculator was developed using the same principles as the TRAQ form. While SCE uses numerical scores to rank trees in their territory and provides numerical threshold at which it is recommended a tree be mitigated, the inspector can use professional judgment for when to abate or not abate a tree that is above or below the recommended numerical threshold. In these cases, the inspector must document the reason their prescription is different from the recommended action based on the Tree Risk Calculator.

SDG&E's inspection company has their own tool that they use for tree risk assessment. The tool is based off ISA industry standards as well as the California Power Line Fire Prevention Field Guide.

### Proposed Changes

PG&E is proposing changes in this area based on the benchmarking with SCE and SDG&E. All proposed changes to our VM programs are included in the "Proposed Changes Based on Benchmarking" section following our discussion of the 10 program topics.

## **5. Workforce Structure**

### Similarities

The three electrical corporations are similar in that they use contract resources to perform a portion of their hazard tree inspections. All three also require that the same tree crew company who performs the routine program work also complete the hazard tree mitigation work.

### Differences

There are differences in inspector qualification requirements and what is required for hazard tree assessments by each electrical corporation.

PG&E:

- As of May 2023,<sup>57</sup> VMI requirements for Routine, Second Patrol, and VMOM:
  - High School Diploma or General Educational Development (GED)
  - Required to maintain a Class C driver's license
  - Physical Ability and must pass Post Offer Physical Assessment (POPA)
  - For all employees, qualification on employment tests as determined by the Company, which may include the,
    - Physical Test Battery, Industrial Skills Test, or other new tests deemed appropriate by the oversight committee.
- FTI: VMI requirements in addition to TRAQ certification required.
- TRI: VMI requirements in addition to TRAQ certification for specific inspection activities

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<sup>57</sup> Inspector qualifications are based on the IBEW Letter Agreement No. 23-20-PGE (<https://www.ibew1245.com/files/PGE-docs/LA-23-26-PGE.pdf>) dated May 22, 2023. These qualifications changed slightly since PG&E filed its WMP in April 2023. The 2- or 4-year college degree was a requirement and is now a desired qualification.

- PG&E relies on both external (contract) and internal (PG&E) inspectors.

#### SCE:

- Pre-Inspector:
  - Possess a 4-year degree in related field with ability to obtain ISA certification in 12 months; OR
  - possess a 2-year degree in related field with one year experience and ability to obtain certification in 12 months; OR
  - Possess two years of industry experience with the ability to obtain ISA certification in 12 months.
- Dead Tree Inspections: No certification required.
- Non-Arborist inspectors identify green trees that have strike potential that need a follow-up Level 2 assessment. The Level 2 can only be performed by an ISA certified arborist.
- SCE does not have internal employee inspectors.

#### SDG&E:

- Pre-inspector: Bachelor's degree in forestry, biology, environmental science, horticulture, or related field (preferred) and current Class C Driver's License with clean driver safety record. Inspectors for the Detailed Inspection Program are not required to be certified arborists.
- Off-Cycle: Require certified arborists.
- SDG&E relies on both external (contract) and internal (SDG&E) inspectors.

All three utilities rely on highly qualified inspectors to conduct inspections in the HFTD. PG&E currently uses TRAQ qualified arborists to perform TRI and FTI inspections. TRI inspects trees in the HFTD that were listed for removal under the EVM Program. FTI addresses high-risk areas that have experienced more vegetation damage during PSPS events, outages, and/or ignitions. SCE relies on certified arborists to inspect all trees listed for work in the Hazard Tree Program (HTP) and SDG&E relies on certified arborists for the Off-Cycle HFTD inspections.

#### Proposed Changes

PG&E is proposing changes in this area based on the benchmarking with SCE and SDG&E. All proposed changes to our VM programs are included in the "Proposed Changes Based on Benchmarking" section following our discussion of the 10 program topics.

## **6. Level of Inspection**

### Similarities

Each electrical corporation uses a Level 1 assessment for hazard tree assessments in non-HFTD areas. When certain tree characteristics are observed then the inspector would perform a Level 2 inspection. A Level 2 can also be conducted at the inspector's discretion.

### Differences

The electrical corporations are different in terms of when and how they apply different levels of inspections in the HFTD.

PG&E conducts a Level 1 inspection for the Routine, Second Patrol, FTI, and VMOM programs. If any of the tree characteristics specified in the inspection procedure are observed, or when a VMI suspects that those conditions may exist, then a Level 2 must be completed. PG&E conducts Level 2 inspections on the trees in our TRI Program.

PG&E improved our guidance to inspectors regarding the specific criteria for performing a Level 2 inspection. The improved guidance is in the updated DIP (TD-7102P-01 published 4/20/23).

SCE conducts a Level 2 assessment on subject trees within the annual scope of work. Every strike tree will receive an annual Level 2 assessment if it is in TRI area A. SCE conducts a Level 2 assessment once every 3 years for trees in TRI areas B, C, and D.

SDG&E conducts a Level 2 inspection on all strike trees located in the HFTD during both the Detailed Inspection and the Off-Cycle Patrol.

### Proposed Changes

PG&E is proposing changes in this area based on the benchmarking with SCE and SDG&E. All proposed changes to our VM programs are included in the "Proposed Changes Based on Benchmarking" section following our discussion of the 10 program topics.

## **7. Inspection Process**

### Similarities

The electrical corporations are consistent in that we each create a record in our respective database when a hazard tree is listed for work. We are also consistent in that if an emergency condition (PG&E "P1", SCE "P1", SDG&E "Memo Tree") is identified, it is typically mitigated within 24 hours.

### Differences

Each electrical corporation uses a different database for storing tree records and work management solutions. The criteria for creating a tree record in the utility database is different among electrical corporations:

- PG&E creates a tree record for trees being listed for work;
- SCE creates a record for every tree in the HFRA that has strike potential; and
- SDG&E creates an inventory tree record for vegetation with the potential to encroach upon the minimum clearances of energized power lines either by tree growth or branch/trunk failure within 3 years of inspection date. SDG&E records tree-related outage data/investigations within their inventory database. As such, SDG&E also creates inventory tree records for trees that cause an electrical outage that were not in the inventory prior to the outage event.

SCE uses a numerical scoring system that is the output from its tree assessment tool (Tree Risk Calculator). PG&E and SDG&E do not use a numerical scoring system. Each electrical corporation uses a different database system due to system compatibility and integration within the utility as well as what system meets the business needs of the utility.

### Proposed Changes

PG&E is proposing changes in this area based on the benchmarking with SCE and SDG&E. All proposed changes to our VM programs are included in the “Proposed Changes Based on Benchmarking” section following our discussion of the 10 program topics.

## **8. Work Cycle**

### Similarities

As noted above, all three electrical corporations complete work that is listed for an emergency condition (PG&E “P1”, SCE “P1”, SDG&E “Memo Tree”) typically within 24 hours.

### Differences

PG&E counts the time to work completion by starting with the day the tree was listed for work, while SCE counts time from when inspection was performed and prescribed mitigation entered in the work management system. Hazard and Dead and dying trees are to be completed within 180 of identification. PG&E’s updated Distribution Vegetation Management Program Standard (TD-7102S 4/20/23) includes a requirement that tree work must be completed within one year (barring external factors) of being listed for work beginning in 2024.

SCE is targeting 180 days from assignment for all work of identification for hazard trees (green trees and dead and dying trees) contingent on access and approval to perform the work.

SDG&E completes work 2-4 months after inspection on average based on its annual, static Master Schedule of activities.

## Proposed Changes

PG&E does not plan to make any changes to our work cycle following benchmarking with SCE and SDG&E. We believe that the changes implemented in the update to the Distribution Vegetation Management Program Standard (TD-7102S 4/20/23) specifying the timeline for work completion and the Priority Tag Procedure (TD-7102P-17) are appropriate.

## **9. Quality Control**

### Similarities

Each electrical corporation is similar in that they perform QC inspections and use a sampling methodology to perform the work.

SCE and SDG&E are similar in that SCE audits all trees prescribed for work in their HTP Program to ensure the correct mitigation was performed. SDG&E's QA/QC Program audits approximately 15 percent of all completed tree work using statistical sampling, and all hazard tree and tree removal activities that result from audits of all hazard tree and tree removal activities that result from the off-cycle HFTD inspection activity. PG&E audits hazards trees as part of the overall quality programs for each primary VM Program through use of Level 1 and Level 2 inspection criteria, capturing data for any findings that result from said process and is including a quality check as part of the FTI pilot efforts.

### Differences

PG&E reviews/audits a sample of completed VM work locations within a traditional QC/QA quality management system structure, where QC reviews approximately 80 percent of completed VM work locations within HFTD (barring external factors), including areas where work is complete, to ensure compliance has been achieved. QA subsequently audits "QC complete" locations using a statistical sampling model of 95 percent confidence and 5 percent margin of error or greater.<sup>58</sup> Please refer to our response to Revision Notice 02 for more information about our VM quality control program.

SCE has a comprehensive QC process where it conducts an independent risk assessment using a CL/CI Sampling at 99/2 percent (minimum 4,000 trees annually). QC typically targets the assessments of trees with a Tree Risk Calculator score of 35-49. If QC scores a tree at >55, then it is provided back to the original assessment company for a lead inspector to re-assess. It then becomes the best score out of 3 to determine if tree will be listed for work.

SDG&E's audit process includes ~15 percent random sample of work performed.

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<sup>58</sup> PG&E describes our Quality Management System layers of defense in Section 8.2.5 of the 2023-2025 WMP, R1.

## Proposed Changes

PG&E does not plan to make any changes to quality control following benchmarking with SCE and SDG&E.

### **10. Leveraging Technology**

#### Similarities

Each electrical corporation is similar in that they have piloted the use of LiDAR on their distribution system, but no utility is regularly collecting system-wide LiDAR to support their Distribution Vegetation Management Program.

#### Differences

PG&E uses LiDAR for our annual transmission Routine Inspection and Second Patrol programs to classify vegetation based on its proximity to the facilities and to identify strike trees and determine encroachment distances. This forms the basis for where ground patrols will be conducted.

SCE uses LiDAR to identify trees in HFRA that have strike potential. Trees with strike potential are then assessed for condition by an ISA Arborist. The LiDAR collection frequency is conducted based on the risk for the area. Areas classified as “A” have LiDAR collected every year, areas “B” every other year, “C” is every 3 years, “D” is every 5 years, and “E” is every 10 years. On the years that LiDAR is not collected, a field inspection is still conducted.

SDG&E is still piloting the use of LiDAR and satellite imagery to support its Vegetation Management Program.

PG&E has found LiDAR to be a beneficial tool on our transmission system because of its ability to accurately measure distances and provide insight into where field inspections need to occur as well as the areas void of vegetation that do not need to have a field inspection. Due to the right-of-way size and construction configuration, LiDAR to support vegetation management is currently more conducive to use on transmission than distribution. PG&E is exploring remote sensing technology to enhance our vegetation management inspection for distribution and transmission system.

#### Proposed Changes

PG&E does not plan to make any major changes in how we use LiDAR following benchmarking with SCE and SDG&E. We are planning to selectively use remote sensing (LiDAR/Satellite) to strengthen vegetation management inspections.

### **PROPOSED CHANGES BASED ON BENCHMARKING**

Benchmarking with SCE and SDG&E was valuable, and we will continue to exchange information about VM practices and procedures. From the benchmarking, we identified activities and practices SCE and SDG&E are doing that may be reasonable to incorporate into our VM programs, as described below. It is impossible to directly

compare PG&E's territory to the other utilities because of the size and make up of our territory. PG&E has millions of strike trees in our HFTD compared to SCE that has 350,000 strike trees and SDG&E that has approximately 495,000 total inventory trees with about 50% of those located in the HFTD. What is practical and reasonable for SCE and SDG&E is not necessarily practical and reasonable for PG&E.

While there are differences between how PG&E executes our VM programs in terms of scope and time compared to SCE and SDG&E, that does not mean PG&E is leaving risk on the system. Along with our VM programs, we protect our system through our portfolio of Comprehensive Monitoring and Data Collection, Operational Mitigations, and Resilience Mitigations. Each circuit segment on our system is protected by multiple mitigations such as aerial and ground asset inspections, pole and non-pole maintenance programs, Downed Conductor Detection (DCD), Enhanced Powerline Safety Settings, and System Hardening.<sup>59</sup> These layers of protection help to reduce wildfire risk across the system as vegetation management work occurs.

PG&E describes below the changes we are proposing based on benchmarking with SCE and SDG&E.

#### Program and Workforce Structure, Inspection Cycle, and Levels of Inspection

Based on the benchmarking with SCE and SDG&E, PG&E sees there are opportunities to adjust our inspection cycle as it relates to the level of inspection. We are committed to making improvements in these areas and are working on developing what an appropriate inspection cycle would be for our diverse service territory given our varied ecological regions, forest types, volume of vegetation, and weather patterns.

PG&E proposes the following:

- 1) In 2024, PG&E will cover 1,800 miles in the FTI Program that will include Level 2 inspections on all strike trees.
- 2) PG&E will report the results of the 2024 FTI Level 2 inspections in the WMP submitted in 2025.
- 3) In 2025, PG&E will evaluate the results of the 2024 Level 2 inspection data and determine if and where Level 2 inspections should be applied to other programs.
- 4) PG&E will report on any plans for changing VM programs, or the reasons we do not propose any changes, based on the 2025 evaluation in the WMP Update submitted in 2026.

#### Benchmarking Areas: Guidance Documents and Tools

PG&E updated our distribution vegetation management standard and procedure. We aligned the Standard and Procedure with the industry standards, especially with the

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<sup>59</sup> Attachment 2023-04-06\_PGE\_2023\_WMP\_R1\_Section 6.4.2\_Atch01 is a list of the mitigations planned for each circuit segment.



California Power Line Fire Prevention Field Guide, including a list of defects for inspection.

Based on the benchmarking, we recognize the benefits of the Tree Risk Calculator (TRC) SCE is using. We will continue to work with SCE to learn more about the TRC as we analyze what tools and methods will work best in our diverse territory. In February 2023, we also benchmarked with an Australian Utility regarding its hazard tree assessment practices.

PG&E proposes:

- 1) In 2024, PG&E will further evaluate SCE's tool to determine if can be used/adapted for PG&E's VM programs.
- 2) PG&E will report the results of the 2024 tool development in the WMP submitted in 2025.
- 3) In 2025, PG&E will evaluate the tool we develop in 2024 through a pilot project field evaluation.
- 4) PG&E will report the results of the 2025 tool evaluation in the WMP update submitted in 2026.

#### Workforce Structure:

PG&E is committed to fostering and developing an industry leading internal workforce. PG&E will continue to bring on additional internal VMI's for work force stability, consistent training, and knowledge retention.

PG&E proposes:

- 1) PG&E will hire 150 VMIs by the end of December 2024.
- 2) PG&E will report on the number of VMIs hired in the WMP submitted in 2025.

***Remedy g. Justification of why PG&E ended the use of its TAT in favor of the ISA's TRAQ Form, and demonstration of the effectiveness of the ISA's TRAQ Form versus PG&E's most recent version of its TAT.***

#### **Response to Critical Issue Remedy g:**

The TAT was developed specifically for PG&E's Enhanced VM (EVM) Program and was not created as an alternative to the TRAQ. The TAT was developed to fit the scope of the EVM Program. With the conclusion of EVM, PG&E has decided to discontinue the use of the TAT and will be moving forward with industry accepted assessments using the TRAQ form by TRAQ qualified VMIs for the certain VM programs.

The ISA TRAQ is an industry accepted tree risk assessment methodology. The TRAQ is supported by a qualification program designed to train and assess candidates in a specialized field of arboriculture. The TRAQ also has pre-requisites for candidates to be eligible to apply for the TRAQ course. We are increasing the number of TRAQ

inspectors, and our current plan is that FTI Inspections will be performed by 100 percent TRAQ certified arborists.

Given that we began working with the ISA TRAQ in 2023, data does not exist to objectively compare effectiveness differences between ISA TRAQ and the TAT. Therefore, we are relying on the industry accepted tree risk assessment methodology.

**Remedy h.** *A description of how PG&E will incorporate the following tree risk factors into Focused Tree Inspections, and any Level 2 inspection performed during Distribution Routine Patrol, Distribution Second Patrol, and Tree Removal Inventory as guidance to inspectors or otherwise. If PG&E will not incorporate one or more of these factors, it must explain why for each factor it will not incorporate.*

- i) *Regional Species Fire Risk Rating aggregated at EPA Level III Ecoregions.*
- ii) *Height: Diameter at breast height (HT:DBH) for selected species.*
- iii) *Wind, from the “Comprehensive Wind” model created with PG&E’s meteorology data as proposed in the Targeted Tree Species Study.*
- iv) *Fire-related damage.*
- v) *Insect presence and damage*
- vi) *Defects (e.g., conks, co-dominant tops, cracks, shallow roots, open wounds, cat-face, etc.)*
- vii) *Lean towards facilities.*
- viii) *Fall path to facilities (e.g., clear, partially blocked, fully blocked).*

#### **Response to Remedy h:**

PG&E will incorporate the eight risk factors (numbers i through viii) into our procedures as guidance to inspectors as follows:

- i) *Regional Species Fire Risk Rating aggregated at EPA Level III Ecoregions.*

We will add Regional Species Fire Risk Ratings as an attachment for guidance in the DIP. As an additional action, PG&E plans to perform a feasibility analysis in Q4 2023-Q1 2024 to evaluate if this can be incorporated into the OneVM tool.

- ii) *Height: Diameter at breast height (HT:DBH) for selected species.*

Poor diameter-to-height ratio is included in our Overview of Tree Defects and Site Conditions (DIP Appendix B). Additionally, PG&E plans to perform a feasibility analysis in Q4 2023-Q1 2024 to evaluate if this can be incorporated into the OneVM tool.

- iii) *Wind, from the “Comprehensive Wind” model created with PG&E’s meteorology data as proposed in the Targeted Tree Species Study.*

We will add Regional PSPS Lookback maps as an attachment to the DIP. Additionally, PG&E will perform a feasibility analysis in Q4 2023-Q1 2024 to evaluate if this can be incorporated into the OneVM tool, publish PSPS lookback maps, and/or regional foehn wind maps at frequency thresholds recommended by PG&E meteorology on VM specific GIS suites similar to Areas of Concern (AOC) mapping.

iv) Fire-related damage.

Guidance to inspect for these conditions is provided in Attachment B of the current DIP. Additional guidance is provided in the VM Post Fire Patrol Standard TD-7114S (see Appendix E of the 2023-2025 WMP)

v) Insect presence and damage

Guidance to inspect for insect presence and damage is provided in Attachment B of the DIP.

vi) Defects (e.g., conks, co-dominant tops, cracks, shallow roots, open wounds, cat-face, etc.)

Guidance to inspect for these defects is provided in Attachment B of the DIP.

vii) Lean towards facilities.

Guidance to inspect for lean towards facilities is provided in Attachments B and E of the DIP

viii) Fall path to facilities (e.g., clear, partially blocked, fully blocked).

We will add guidance in DIP to inspect for these conditions.

***Remedy i.*** A list of the information that will be digitally recorded (into OneVM or another system) during Focused Tree Inspections and any Level 2 inspection performed during Distribution Routine Patrol, Distribution Second Patrol, and Tree Removal Inventory. PG&E must also report when this information will start being digitally recorded by inspectors in the field. PG&E should consider digitally documenting all relevant factors that contributed to an inspector's designation of a tree as a hazard, or not a hazard, and any resulting abatement prescription.

**Response to Critical Issue Remedy i:**

The Distribution Routine Patrol, Distribution Second Patrol, and FTI Programs have been implemented in OneVM where project data is digitally recorded. For a list of the information that will be digitally recorded into One VM through these programs please see Attachment 2023-08-07\_PGE\_23-07\_RNR\_\_R0\_Atch01. There are no fields in OneVM to collect Level 2 inspection data from Routine, Second Patrol, and FTI

Programs. The TRAQ form that is used during FTI Inspections will not be digitized at this time.<sup>60</sup>

The Tree Removal Inventory Program digitally records data into a system called Field Maps. The data entered into the system includes information about Level 2 inspections. Our current procedure requires that a photograph of the TRAQ form is taken after the inspection is completed for digital record keeping purposes if the TRAQ certified arborist determines abatement is not required. TD-7102P-01-Att06 outlines the photo requirements as well as the attributes captured from the field inspection.

As we implement the long-term roadmap of transitioning all VM programs into One VM and consider learnings from other programs including implementation and data collected, we will develop a plan for what will be digitized on each program.

**Remedy j.** *An assessment of the residual risk posed by the Tree Removal Inventory trees and, while considering this residual risk assessment, demonstration that the proposed reinspection pace adequately addresses risk from these trees.*

**Response to Critical Issue Remedy j:**

PG&E estimates that the residual risk posed by the Tree Removal Inventory (TRI) trees is approximately 7 percent of vegetation risk in the HFTD.

[Table RN-PG&E-23-07-4](#) below shows the current residual risk due to the TRI trees.

**TABLE RN-PG&E-23-07-4:  
TRI RESIDUAL RISK**

Line No.	Description	No. of Units <sup>(a),(b)</sup>	MAVF Risk Points	Percent of Vegetation Risk
1	All Removal Trees	384,930	686	7%

- (a) This figure is as of February 2023. It represents the best estimate of the trees marked during the EVM Program that may remain in the field.
- (b) This estimate will continue to be refined each year as the trees are visited to check if the trees have been removed by other programs or no longer pose a risk to PG&E facilities.

Our proposed pace for the TRI Program adequately addresses the risk from these trees. PG&E reduced the vegetation risk in the HFTD under the legacy EVM Program, and we have operational mitigations in place that effectively manage vegetation-related risk. Given the residual risk posed by the TRI inventory, and the protection provided by our operational mitigations discussed below, the initial pace of the TRI Program is a starting point.

PG&E uses Enhanced Powerline Safety Settings (EPSS) Program to help manage ignition risk. Along with EPSS, PG&E also has two more operational mitigations in

<sup>60</sup> PG&E discussed this with Energy Safety during a meeting on April 20, 2023.

place to manage ignition risk while TRI trees are being mitigated. Downed Conductor Detection (DCD) improves the system's ability to detect and isolate high impedance faults before ignitions occur.<sup>61</sup> PG&E has enabled single-phase and polyphase SmartMeters™ to send real-time alarms to the Distribution Management System when they detect partial voltage conditions (25 to 75 percent of nominal voltage), or full or partial loss of phase (in polyphase). Detection of partial voltage conditions allows Control Center Operators to dispatch field personnel to locations where equipment may be in a condition that increases wildfire risk. This technology helps PG&E detect and locate a wire down condition within minutes that may reduce the amount of time a line is energized while down (where it can cause an ignition) and allow first responders to extinguish wire-down related ignitions more quickly if they occur.<sup>62</sup>

The TRI Program is working down its tree inventory in a risk informed manner and is focused on mitigating the trees in the highest risk CPZs in 2023. The initial plan estimates mitigating the known marked trees over the course of approximately nine years. The pace of TRI is continually evaluated to determine if the work can be completed sooner than planned. Additionally, as part of our annual vegetation management program, twice a year we inspect the trees that remain in place until they are scheduled to be mitigated. If an inspector identifies a TRI listed tree that presents a hazard (the condition of the tree has worsened) during any inspection, that tree is prioritized for mitigation.

Also, as part of our layers of protection approach, our operational mitigations, including EPSS, have been effective in reducing wildfire risk. CPUC-reportable ignitions on EPSS-enabled lines in HFTD areas have decreased by 68 percent (compared to weather-normalized 2019-2020 average ignitions). We have also observed a 99 percent decrease in total HFTD acres burned—relative to the 2018-2020 average—a primary driver for this is understood to be the reduced fault energy that occurs when EPSS protection is enabled.<sup>63</sup>

***Remedy k.*** *A quantitative analysis of the expected risk reduction over the 2023-2025 WMP period due to its new vegetation programs (i.e., Focused Tree Inspections, Tree Removal Inventory, and VM for Operational Mitigations) compared to its legacy EVM Program.*

#### **Response to Critical Issue Remedy k:**

PG&E conducted an analysis where we estimated the risk reduction from 2023-2025 for the two new VM programs compared to EVM. Our analysis indicates that FTI and VMOM together will be more effective at reducing risk than the legacy EVM Program.

PG&E's analysis compares the benefits of FTI and VMOM to EVM. Even though TRI is also a new VM Program, we excluded the TRI Program from this analysis because it will

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<sup>61</sup> 2023-2025 WMP, R1, p. 268.

<sup>62</sup> 2023-2025 WMP, R1, p. 269.

<sup>63</sup> 2023-2025 WMP, R1, p. 467.

reduce the same risk as the EVM Program would and counting the TRI risk reduction would double-count the benefits.

In developing the analysis, PG&E relied on SME judgment to estimate the effectiveness of the two new VM programs because the work started only this year, and there is not sufficient information to conduct a more quantitative analysis. Since PG&E did not plan EVM work for 2023-2025, we assumed for the purposes of this analysis that we would conduct 1,800 miles of EVM each year.<sup>64</sup>

[Table RN-PG&E-23-07-5](#) below shows the risk reduction from EVM compared to the three new VM programs.

**TABLE RN-PG&E-23-07-5:  
RISK REDUCTION OF EVM COMPARED TO FTI AND VMOM**

Line No.	Scenario	Risk Points Reduced <sup>(a)</sup>	Annual Exposure	Annual Cost (\$M)	\$/Risk Point Reduced (\$M)	Vegetation Risk Reduced
1	EVM	178	1,800 miles	\$793.5	\$4.5	1.9%
2	Total New VM Programs	199	±1,690 miles	\$142.0	\$0.8	2.1%
3	Focused Tree Inspections	174	1,285 miles avg.	\$117.7	\$0.7	1.8%
4	VM Operational Mitigations	26	405 miles avg. <sup>(b)</sup>	\$24.3	\$1.0	0.3%

- (a) Does not include the incremental risk reduction benefit from the improved Routine Inspection or Second Patrol procedures. PG&E estimates the improved procedures are 3 percent more effective at reducing risk than the legacy procedures.
- (b) For the purposes of the risk calculation PG&E represented the annual VMOM work in number of miles. The average number of miles of exposure is based on the number of miles associated with EPSS outages that were patrolled and an estimated number of trees per mile. The 450 miles of average annual exposure does not represent a specific target or commitment for this program.

The FTI Program is focused on inspecting high risk trees in AOCs. The AOCs are identified using meteorology data and vegetation data including outage clusters, PSPS vegetation damage locations, and vegetation caused ignitions and are evaluated by Public Safety Specialists. PG&E will continually refresh the AOCs to focus on the highest risk areas. This refresh will provide more risk reduction benefit than EVM because the EVM Program worked systematically through the circuit segments (eventually moving to lower risk circuit segments), whereas FTI is always focused on the highest risk areas, even returning to areas multiple times if they continue to exhibit

<sup>64</sup> To determine which CPZs would be included in an EVM workplan for 2023-2025: (1) we started with a list of all CPZs ranked by the tree-weighted risk model; (2) eliminated the CPZs where EVM was already completed; (3) and selected the next 5,400 miles (1,800 miles x 3 years) based on the tree-weighted risk rank and assumed that these would be the miles completed over the next three years.

high risk characteristics. The FTI Program also uses the most qualified inspectors Certified Arborists with TRAQ certification.

Even though the benefits from the improved Routine and Second Patrol programs are not included in the analysis above, PG&E expects that they will be more effective at reducing vegetation risk. We expect they will be more effective because of the new procedures and requirements related to Level 2 inspections and expanding the scope of the Second Patrol to include an inspection of the entire HFTD as opposed to just inspecting dead and dying trees.

PG&E's risk reduction analysis does not account for other mitigations that will help to reduce risk in the HFTD. We rely on EPSS and DCD as our primary tool for reducing vegetation caused ignitions. EPSS was not in place for the majority of the EVM Program, so we did not include its benefits in the risk reduction analysis. With EPSS protection across the HFTD we can use our new, more targeted programs to focus on the highest risk areas.

An additional benefit from the new programs is the cost to reduce vegetation risk. [Table RN-PG&E-23-07-5](#) above shows that the annual cost per risk point reduced is significantly less for the new VM programs than the legacy EVM.

***Remedy I.*** *A quantitative analysis of the expected risk reduction over the 2023-2025 WMP period due to its updated Routine Patrol and Second Patrol procedure compared to its former Routine and Second Patrol procedure.*

#### **Response to Critical Issue Remedy I:**

The updates to the Routine Patrol and Second Patrol procedures were effective June 20, 2023. Because the two procedures have only been in effect for approximately three weeks, PG&E does not have sufficient data to conduct a quantitative analysis of the expected risk reduction over the 2023-2025 WMP period. Using SME judgment, PG&E expects to achieve improved risk reduction of approximately 3 percent, plus incremental improvements as the programs mature.

We expect to achieve greater risk reduction in the Routine Patrol Program because the updated procedures: (1) require the inspector to move to a Level 2 inspection if they observe any of the specific tree defects from the California Power Line Fire Prevention Field Guide; (2) The California Power Line Fire Prevention Guide recommends removing a tree rather than trimming it if it is listed for work; (3) inspectors must review historical outage data before going into the field; and (4) we anticipate tighter controls on schedule attainment and reductions in annual carry-over within Routine and Second Patrol programs.

In addition, Second Patrol now includes a broader scope of work than just dead or dying trees. It includes management and reduction strategies for trees that cannot be prescribed enough clearance to maintain 1-year compliance and no other alternatives are available.

We anticipate that the new procedures will prompt more Level 2 inspections, which will help to identify more vegetation-related risk on the system. Additionally, we are

collecting situational awareness data on high-risk trees from the new FTI Program that we will use to bolster Routine and Second Patrol inspections.



## Critical Issue RN-PG&E-23-08

**Critical Issue Title:** *PG&E's PSPS decision-making process does not accurately account for EPSS enabled circuits, which could potentially lead to more PSPS events than needed.*

**Remedy # 1:** *PG&E must revise its WMP with a detailed plan and timeline on how it will accurately account for EPSS enabled circuits in its PSPS decision-making process.*

### Responses to Critical Issue Remedy # 1:

In our response to RN-PG&E-23-08, we provide an overview of our current PSPS protocols and models, the EPSS Program, and a framework and timeline for how we are considering accounting for changes in ignition probability due to EPSS or any program that reduces ignition probability. We are modifying our existing commitment, SA-05, which speaks to improvements to the Ignition Probability Weather (IPW) modeling framework to explicitly refer to EPSS. Enhancements to SA-05 that address the Revision Notice concerns are planned to be completed in 2024. The updates to IPW will then be incorporated into PSPS protocols, which are tied to commitment PS-02.<sup>65</sup>

We describe our PSPS decision making protocols in detail in Section 9.2.1 of our 2023-2025 WMP. The decision to inform when PSPS is necessary is a multi-step process where we first determine if minimum fire potential conditions are met followed by an in-depth evaluation of three measures that could warrant turning off power proactively for public safety. The three measures for distribution PSPS protocols are shown in Figure 9.2.1-1, Visual Representation of Distribution PSPS Decision-Making, as follows:

- A) Catastrophic Fire Probability (CFP);
- B) Catastrophic Fire Behavior; and
- C) Vegetation and Electric Asset Criteria Consideration.

The CFP Model is the primary method used to determine if PSPS is necessary. This model combines the probability of an ignition given an outage due to weather and the probability that a fire will be catastrophic. The CFP is derived by computing the product of Fire Potential Index (FPI) model and the IPW models in both space and time. It is a risk-based assessment of the probability of an ignition multiplied by the impact and is given by the equation below:

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<sup>65</sup> For additional information on commitments PS-02 and SA-05, see response to [RN-PG&E-23-01](#).

$$CFP_{Distribution(x,y,t)} = IPW_{(x,y,t)} \cdot FPI_{(x,y,t)}$$

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Note: In this equation, x and y are grid cell locations in the west-east and north-south directions, respectively, and t is time in hours.

Given its design and purpose, the FPI Model is not influenced by grid-related operations like EPSS<sup>66</sup> as it seeks to determine how environmental factors influence fire spread. Thus, the effectiveness of any program that aims to mitigate outages and ignitions would be addressed through IPW.

The IPW Model is a machine learning model that leverages sustained and momentary outage data back to 2008 and historical utility ignition data across five outage-ignition classes to determine the likelihood of an ignition given an outage. IPW is given by

$$IPW = P(\text{utility ignition}_{x,y,t}) = \sum_{class}^{cause\ classes} P(\text{Outage}_{class,x,y,t}) * P(\text{Ignition}_{class} | \text{Outage}_{class}).$$

IPW is trained on actual grid performance leveraging a robust historical weather dataset at 2 x 2 km spatial and hourly temporal resolution. The model is passed hourly weather data (e.g., wind speed, turbulence, temperature), vegetation, and outage and ignition data. This enables hourly predictions of outage and ignition probabilities across the entire PG&E domain accounting for the heterogenous nature of assets and vegetation exposure. This is an extension to a similar approach to utilize wind speed thresholds on a circuit-by-circuit basis for PSPS decisions.

We point out that EPSS, like any program that would reduce the probability of ignitions, would be expressed through IPW in our current PSPS protocols. EPSS is a relatively new program, which was launched as a pilot in 2021 and expanded in 2022 to cover 44,000 line-miles including all high fire-risk areas. While EPSS has demonstrated promising ignition mitigation results, EPSS does not fully eliminate the potential for ignitions as we still observed 31 HFTD CPUC Reportable Ignitions on circuits where EPSS was enabled in 2022.

We acknowledge that any ignition, with the appropriate fuels and weather conditions, could grow into a large or catastrophic fire if not suppressed. During PSPS events, fuels are typically critically dry, Red Flag Warnings are in effect and a Diablo wind event is occurring. Even with EPSS enabled during these events, if circuits are not de-energized, there remains a possibility that ignitions may occur when there is an increased probability of extreme consequences.

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<sup>66</sup> The FPI model is a fuels-, weather- and topography-based model that estimates the probability of large and catastrophic fire growth given an ignition, and therefore FPI is not influenced nor adjusted by grid-related operations like EPSS. 2023-2025 WMP, R1, pp. 613-618.

Thus, very thoughtful, and careful consideration should be applied to any adjustments to our PSPS models and protocols, as the goal of PSPS is to mitigate relatively low probability yet very high to extreme consequence fire events. The approach outlined below will allow us to leverage a broader set of results to inform if critical adjustments to our PSPS protocols can and should be made.

Our plan to consider and potentially account for EPSS enablement and ignition mitigation into our PSPS models through IPW is described below.

- Through 2023, we plan to evaluate ignition to outage rates in the HFRA during the summer into fall Diablo wind season. A year-over-year analysis of the ignition to outage rates will allow an assessment of the variability of ignition to outage rates and any general trends. As ignition occurrence is relatively sparse in a given year, we need to consider if trends and results are statistically reliable.
- In 2023, we will also evaluate EPSS' capability of reducing ignitions during high wind events as the majority of EPSS ignitions in 2022 occurred in low-wind cases. Due to favorable weather in 2022, there were no strong offshore wind events and no PSPS events. The efficacy of EPSS in a high-wind scenario versus low-wind scenario is an area for further study. We anticipate very limited data in any statistical analyses of high wind ignitions cases given the short time frame the EPSS Program has been in effect and general lack of high-wind ignitions.
- Near the end of 2023, we plan to present initial findings to PG&E's Wildfire Risk Governance Steering Committee (WRGSC) for guidance and feedback on any analyses and studies.
- By September 1, 2024, or earlier, if possible, we may operationalize an update to IPW that considers EPSS enablement from studies in 2023 into 2024 if approved by the PG&E WRGC. This update would likely be based on our preferred method of utilizing actual performance data of outages and ignitions and not adjusting final outputs based on an individual programs' effectiveness calculation.

**DOCUMENTS REFERENCED IN RESPONSE TO CRITICAL ISSUES**

<b>Critical Issue</b>	<b>Reference Number</b>	<b>Description</b>	<b>Location</b>
RN-PG&E-23-01	Decision 19-05-042	Decision Adopting De-Energization (Public Safety Power Shut-Off) Guidelines (Phase 1 Guidelines)	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Decision 21-06-014	Decision Addressing the Late 2019 Public Safety Power Shutoffs by PG&E, SCE, and SDG&E to Mitigate the Risk of Wildfire Caused by Utility Infrastructure	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Decision 20-05-051	Decision Adopting Phase 2 Updated and Additional Guidelines for De-Energization of Electric Facilities to Mitigate Wildfire Risk	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Decision 20-06-017	Decision adopting short-term actions to accelerate microgrid deployment and related resiliency solutions.	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Rulemaking 18-12-005, Appendix A	Guidelines and rules in continual improvements to utility execution of Public Safety Power Shutoffs	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	General Order 166	Standards for Operation, Reliability, and Safety	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	ISO 45001 and 14001	ISO 14001 is the international standard for implementing an Environmental Management System. ISO 45001 focuses on managing Occupational Health and Safety concerns.	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Investigation 19-06-015	Investigating the role of Pacific Gas and Electric Company's facilities in igniting fires in its service territory in 2017 and 2018.	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Rulemaking 19-09-027	Decision Establishing a Self-Generating Incentive Program to Support the San Joaquin Valley Disadvantaged Community Pilot Projects	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Order Instituting Rulemaking 18-12-005	To examining rules allowing electric utilities to de-energize power liens in case of dangerous conditions that threaten life or property in California	2023-2025 WMP, R2, Appendix E.

**DOCUMENTS REFERENCED IN RESPONSE TO CRITICAL ISSUES  
(CONTINUED)**

<b>Critical Issue</b>	<b>Reference Number</b>	<b>Description</b>	<b>Location</b>
RN-PG&E-23-01	Rulemaking 12-11-005	Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the California Solar Initiative, and Self-Generation Initiative and Other Distributed Generation Issues	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Decision 20-01-021	Self-Generation Incentive Program Revisions Pursuant to Senate Bill 700 and Other Program Changes	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Federal Aviation Administration Rules Part 107	Airspace authorization rules for drone pilots flying under the small Unmanned Aircraft Systems Rules	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-01	Federal Aviation Administration Rules Part 91	General operations regarding operations of private aircrafts	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-03	Decision 16-01-008	Decision Updating the Annual Electric Reliability Reporting Requirements for California Electric Utilities.	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-04	TD-2305M-JA02	Job Aid: Overhead Assessment, Rev. 11.	2023-2025 WMP, R2, Appendix E.
RN-PG&E-23-04	2023-08-07_PGE_23-04_RNR_R0_Atch01	Status update on the number of backlog work orders since the start of 2023.	2023-2025 WMP, R2, Appendix G.
RN-PG&E-23-05	2023-08-07_PGE_23-05_RNR_R0_Atch01	Addressing circuit segments not included in PG&E's 2023-2026 Undergrounding workplan.	2023-2025 WMP, R2, Appendix G.
RN-PG&E-23-05	2202-07-26_PGE_22-04_RNR_R3_Atch01_Redacted	PG&E's 2022 Undergrounding workplan.	2023-2025 WMP, R2, Appendix G.
RN-PG&E-23-05	2023-03-07_PGE_2023_WMP_R0_Appendix D_ACI PG&E-22-16_Atch01_Redacted	2023-2026 Undergrounding workplan.	2023-2025 WMP, R2, Appendix G.
RN-PG&E-23-05	2023-04-06_PGE_2023_WMP_R2_Section 6.4.2_Atch01	Interim mitigations and system hardening scheduled at the circuit segment level.	<a href="#">Wildfire Mitigation Plan (pge.com)</a>

**DOCUMENTS REFERENCED IN RESPONSE TO CRITICAL ISSUES  
(CONTINUED)**

<b>Critical Issue</b>	<b>Reference Number</b>	<b>Description</b>	<b>Location</b>
RN-PG&E-23-05	Decision 18-12-014	Phase Two Decision Adopting Safety Model Assessment Proceeding (S-MAP) Settlement Agreement with Modifications.	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-05	WMP-Discovery2023_DR_OEIS_008-Q002Atch01_Redacted	Percent of portfolio and mileage in the top 20 percent of PG&E's HFTD based on Wildfire Distribution Risk Model (WDRM) version 2 and version 3.	<a href="#">Wildfire Mitigation Plan Discovery/Data Requests (pge.com)</a>
RN-PG&E-23-05	WMP-Discovery2023_DR_SPD_003-Q004a	Mitigation effectiveness for Undergrounding considering secondary and service lines.	<a href="#">Wildfire Mitigation Plan Discovery/Data Requests (pge.com)</a>
RN-PG&E-23-05	Decision 22-12-027	Phase II Decision Adopting Modifications to the Risk-Based Decision-Making Framework Adopted in Decision 18-12-014 and Directing Environmental and Social Justice Pilots.	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-3102-01	Distribution Inspection Procedure (DIP)	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102P-Att01	Strategies to Manage and Reduce Palms	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102P-Att02	EVM WMP Commitments	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102P-Att03	Identifying Major Woody Stems	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102P-Att04	Handling Stump Resprouts	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102P-Att05	Bi-Annual Tree Management and Reduction Strategy	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102P-Att06	Tree Removal Inventory Program	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102P-Att07	Focused Tree Inspection Procedures	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102P-Att08	Vegetation Management Operational Mitigation Procedure	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7102S	Vegetation Management Program	2023-2025 WMP, R2, Appendix E
RN-PG&E-23-07	TD-7114S	Vegetation Management Post Wildfire Standard	2023-2025 WMP, R2, Appendix E

**DOCUMENTS REFERENCED IN RESPONSE TO CRITICAL ISSUES  
(CONTINUED)**

<b>Critical Issue</b>	<b>Reference Number</b>	<b>Description</b>	<b>Location</b>
RN-PG&E-23-07	2023-08-07_PGE_23-07_RNR_R0_Atch01	List of information that will be digitally recorded in OneVM.	2023-2025 WMP, R2, Appendix G.
RN-PG&E-23-07	N/A	IBEW Letter Agreement No. 23-20-PGE, May 22, 2023.	<a href="https://www.ibew1245.com/files/PGE-docs/LA-23-26-PGE.pdf">https://www.ibew1245.com/files/PGE-docs/LA-23-26-PGE.pdf</a>
RN-PG&E-23-07	2023-04-06_PGE_2023_WMP_R2_Section 6.4.2_Atch01	Interim mitigations and system hardening scheduled at the circuit segment level.	<a href="#">Wildfire Mitigation Plan (pge.com)</a>