Hawaiian Electric

Interim Wildfire Safety Measures

1 Executive Summary

The safety of Hawaiian Electric's[1] customers, employees, and communities is its highest priority. The Company first began developing its Wildfire Safety Strategy (WSS) in 2019, and continues to evolve and adapt the plan to address the elevated risks in Hawaiʻi.

Since the August 2023 Maui windstorm and wildfires, the Company has developed a set of Interim Wildfire Safety Measures to reduce the risk of wildfires associated with utility infrastructure in service territory areas that the Company has identified as posing a higher wildfire risk. These interim measures represent actions the Company either has already started, or will start in 2024, while the Company simultaneously works to develop a more comprehensive WSS. This future, more comprehensive plan will be informed by early-stage wildfire risk analysis and the local knowledge and insights of stakeholders and communities. The Company's WSS will evolve over time as the Company builds more capabilities and gains field experience, and as wildfire risks evolve. The Company intends to publish a longer-term WSS by the end of 2024.

This document sets out the Company's Interim Wildfire Safety Measures. Key components of the Company's Interim Wildfire Safety Measures are summarized in Table 1 below.

[1] "Hawaiian Electric" and the "Company" each collectively refers to Hawaiian Electric Company, Inc., Maui Electric Company, Limited, and Hawaiʻi Electric Light Company, Inc.

Table 1 – Summary of Interim Measures

Report Section	Interim Measure	Description
2.2	Wildfire Risk Modeling	Develop advanced methods to quantitatively analyze wildfire risk to inform mitigation planning and operational decision-making
3.1.1	Video Cameras	Deploy high-definition 360-degree cameras that use artificial intelligence to identify ignitions and notify the Company and first responders
3.1.2	Watch Office	Enable 24/7 wildfire-focused watch office capabilities to monitor video cameras, enhance wildfire ignition detection accuracy, and alert response teams
3.1.3	Weather Stations	Deploy additional weather stations to capture local weather data to enhance key operational decision-making during hazardous weather conditions
3.1.4	Spotters	Utilize human spotters during red-flag conditions to alert system operators and emergency responders of hazardous observations
3.2	Fast Trip Settings and Reclose Blocking	Implement fast-trip settings at substation feeder circuit breakers/reclosers and block reclosing to reduce the potential for ignitions caused by faults during certain weather conditions
3.3	Fault Current Indicators (FCIs)	Deploy new FCIs on high wildfire risk circuits that are capable of coordinating with fast trip settings in order to better locate faults and improve trouble-shooting when fast trip settings are enabled
3.4	Detecting Broken Conductors (Pilot)	Begin pilot projects to evaluate schemes to detect broken conductors and de-energize lines before the conductor hits the ground
3.5	Public Safety Power Shutoff (PSPS) Plans	Develop an early stage PSPS plan for the Company's service territories to be ready to proactively shut off power as a last resort option
4	Inspections	Implement detailed ground and aerial inspections of transmission and distribution overhead assets in high wildfire risk areas
5.1	Pole Replacement and Upgrades	Replace poles and pole hardware to reduce the probability of asset failures that could cause fires
5.2	Conductor Replacement	Replace smaller single-strand copper conductor, limit splices, and remove temporary in-line disconnects to reduce the probability of conductor failure
5.3	Shield Wire Replacement	Replace old/deteriorated shield wire to reduce the probability of failure
5.4	Expulsion Fuse Replacement	Replace expulsion fuses in high wildfire risk areas
5.5	Lightning/Surge Arrester Replacement	Replace arresters in high wildfire risk areas with new models equipped with arc or spark prevention mechanisms
5.6	KPF Air Switch Replacement	Replace existing KPF Air Switches in high wildfire risk areas
5.7	Targeted Re-Design of Spans	Reduce the potential for swing shorts in high wildfire risk areas through targeted re-design of spans
5.8	Fire Retardant Mesh	Install fire retardant mesh on new poles in high wildfire risk areas
6	Enhanced Vegetation Management	Enhance vegetation management practices in high wildfire risk areas to further reduce the potential for vegetation contact with lines

2 Wildfire Risk Analysis and Mitigation Prioritization

2.1 Current Approach

To implement its Interim Wildfire Safety Measures, the Company is leveraging and augmenting maps produced by the State of Hawaiʻi (SOH) Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW) to identify high wildfire risk areas in the Company's service territories. DOFAW's maps identify at-risk wildland-urban interface communities on the major Hawaiian Islands.[2] DOFAW originally developed maps in 2007 and updated them in 2021 based on guidelines from the National Association of State Foresters, and included evaluation of data such as the following to categorize communities into high, medium, or low risk:

1. Historical fire occurrence.
2. Fuel conditions on the landscape and surrounding community.
3. Human and economic values associated with the community (e.g., homes, business, community infrastructure, areas of high historical, cultural, or spiritual significance).
4. Wildland fire protection capabilities, such as the capacity and resources of all agencies and organizations with jurisdiction to undertake fire protection measures.[3]

The Company has augmented DOFAW's maps with reference to the Company's overhead lines. DOFAW centered its analysis on community wildfire risk, so the polygons in its wildfire risk maps are defined by the boundaries of communities. DOFAW's wildfire risk maps are not intended to, and do not, capture the locations of electrical infrastructure running just outside community boundaries that could potentially pose an ignition risk. In many cases, Company-owned electrical lines are located just outside of DOFAW's community boundary lines, traversing undeveloped areas that contain dry brush and grasses. The Company augmented DOFAW's maps by extending the boundaries by one (1) mile in each direction to account for risk associated with overhead electrical facilities that run in these areas. Figures 1-3 below show how the Company expanded the polygons defining DOFAW's "high" at-risk wildland-urban interface communities by one (1) mile. The resulting expanded boundaries currently define Hawaiian Electric's *high wildfire risk areas* (i.e., all areas within the boundaries of the bold red polygons in Figures 1-3 are considered high wildfire risk areas).[4]

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[2] See, *Fire Risk Areas – Hawaiʻi State GIS Program,* https://geoportal.hawaii.gov/datasets/HiStateGIS::fire-risk-areas/about

[3] See, *Field Guidance – Identifying and Prioritizing Communities at Risk*, National Association of State Foresters, June 27, 2003, https://www.forestsandrangelands.gov/documents/resources/nasffieldguidancecommunities.pdf

[4] Some additional circuits outside of the high risk area boundaries in Figures 1-3 are being treated as high wildfire risk areas for Interim Wildfire Safety Measures based on subject matter expert input. Considerations included egress and documented or local knowledge of historical fires or high fuel content. These additional circuits are not reflected in Figures 1-3.

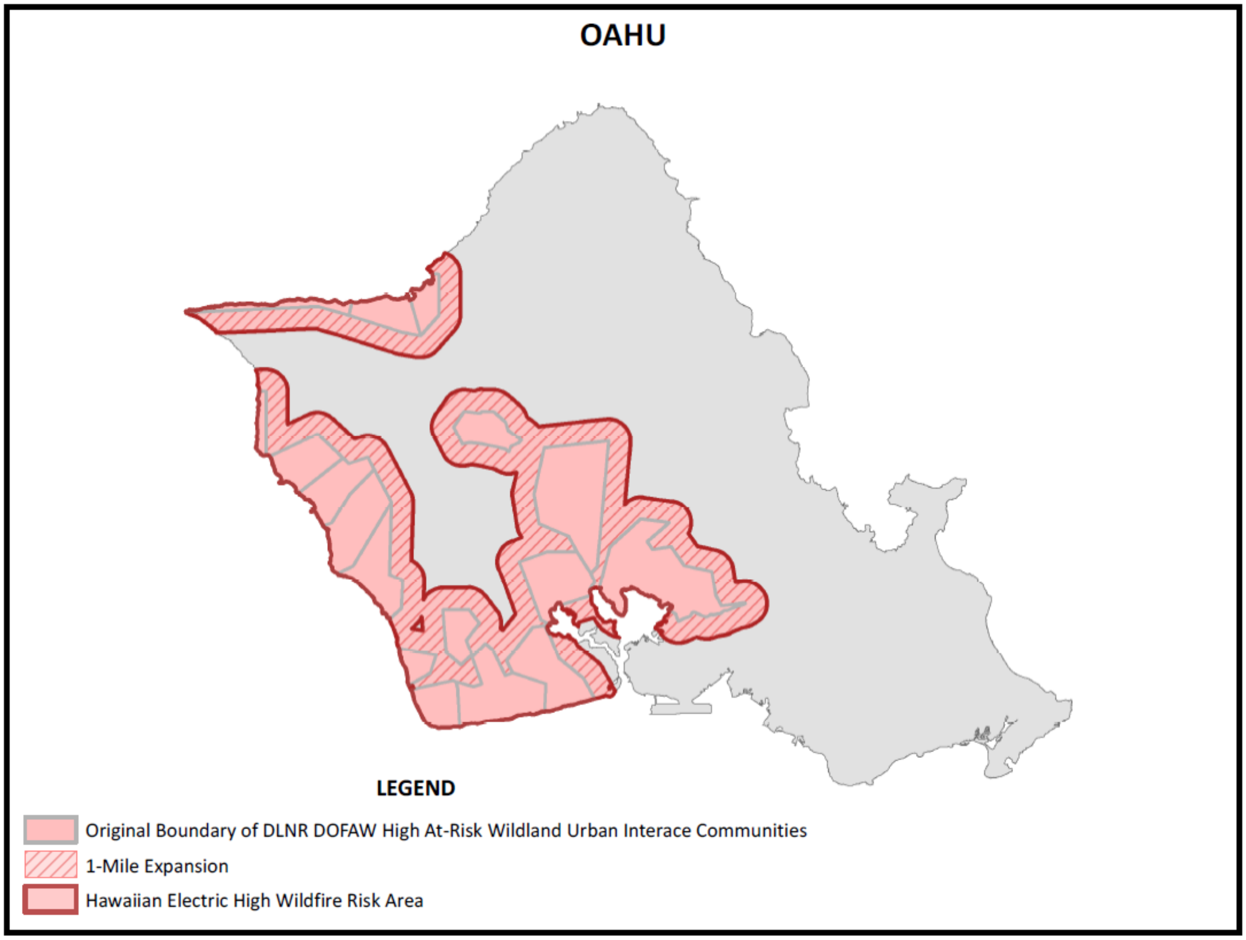

Figure 1 – O'ahu High Wildfire Risk Areas

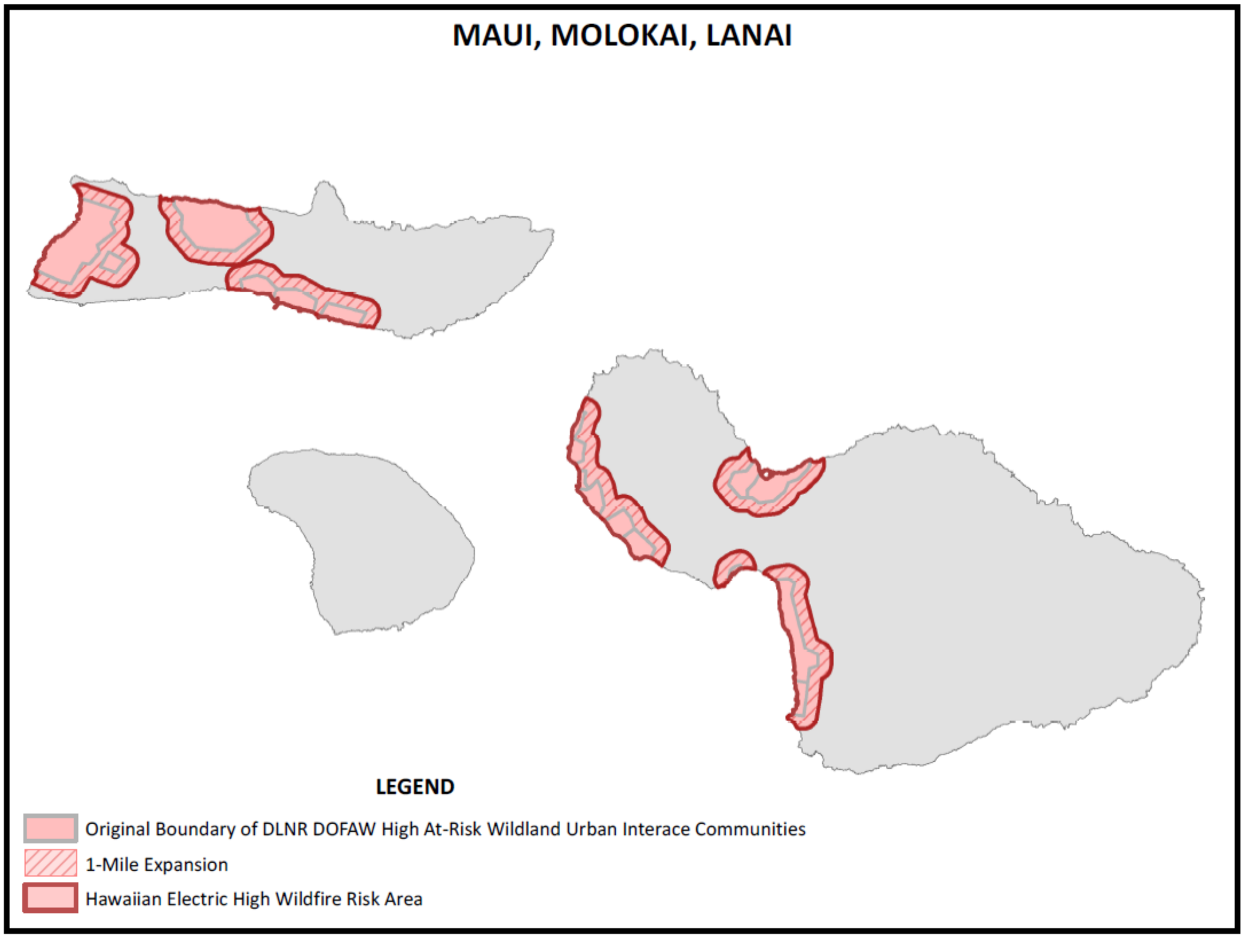

Figure 2 – Maui County High Wildfire Risk Areas

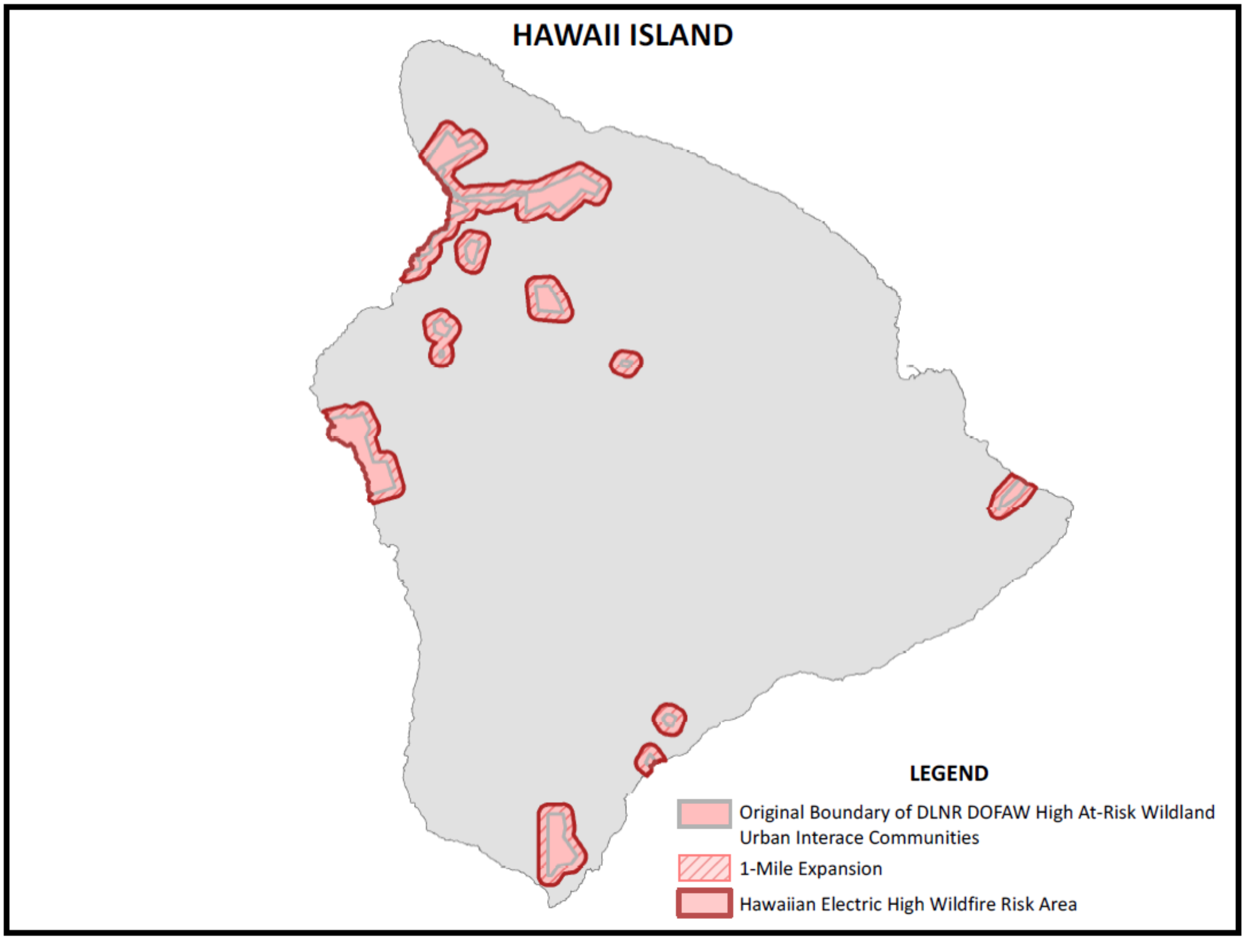

Figure 3 – Hawai'i Island High Wildfire Risk Areas

The Company's Interim Wildfire Safety Measures are prioritized to high wildfire risk areas, as currently identified in Figures 1-3. Within these high wildfire risk areas, circuits are being prioritized for operational changes, enhanced inspections, and system hardening efforts (described in Sections 3, 4, and 5) based on the following factors:

- Number of outages of relevant cause types in the last three years.
- Circuit length of overhead conductor.
- Local knowledge of previous brush fire history, known dry fuel grasses, and areas which would result in only one egress pathway if a wildfire started and resulted in a road closure.

2.2 Wildfire Risk Modeling

The Interim Wildfire Safety Measures reflect a portfolio of immediate-term interventions in high wildfire risk areas based on a combination of lessons learned from other utilities with significant wildfire mitigation experience, as well as internal and external subject matter expertise.

While State-developed wildfire risk maps informed these interim measures, the Company is evaluating technologies, vendors, and organizational capabilities to develop and implement the capability for quantitative risk- informed decision making to inform its wildfire mitigation efforts.

This will include advanced tools and methods to better understand wildfire risk areas, risk of ignition, impact of wildfire consequences to communities, and risk reduction potential of location-specific wildfire mitigations. The Company plans to issue an RFP for wildfire risk modeling and begin development of the model in 2024.

Once wildfire risk modeling capabilities are developed, the Company plans to leverage modeling outputs and engage stakeholders to further refine the results. The Company anticipates using risk modeling to prioritize inspections, system hardening, and vegetation management, to assist in determining the risk-spend efficiency of various investment options, and to inform operational decision-making.

3 Situational Awareness, Operational Procedures, and Grid Design

3.1 Situational Awareness

The Company is assessing and implementing improvements to situational awareness capabilities to better predict and monitor hazardous weather conditions, identify fires, and improve coordination with first responders.

3.1.1 Video Cameras

While the Company has already deployed five dual optical and thermal video cameras, the Company is evaluating higher definition 360-degree video cameras that continuously scan and use artificial intelligence to identify and notify first responders and the Company of early-stage fires. The Company will work with technology providers and key stakeholders to optimally locate and deploy this camera technology in its service territory with the goal of having 90% coverage of high wildfire fire risk areas and nearby electrical infrastructure within the next two years.

3.1.2 Watch Office

The Company plans to enable 24/7 wildfire-focused watch office capabilities in 2024 that would monitor video cameras, enhance wildfire ignition detection accuracy, and alert response teams.

3.1.3 Weather Stations

The Company has already installed eight weather stations that capture humidity, temperature, wind direction, and wind speed in high wildfire risk areas. In addition, the Company has 41 other weather stations across the islands that provide at least wind speed data for other reasons, such as Independent Power Producer (IPP) projects. Further measurement of weather conditions along transmission and distribution lines to capture localized readings outside a substation will be needed to enhance key operational decisions such as PSPS during hazardous weather conditions. The Company is working to identify the quantity and locations of additional weather stations to be deployed beginning in 2024.

3.1.4 Spotters

At the end of August 2023, the Company formalized and implemented procedures to deploy human spotters at strategic locations on all the islands during red flag conditions as issued by the National Weather Service, where feasible. The spotters consist of Company personnel who are familiar with Company overhead and substation assets. Spotters are trained to call System Operation and emergency responders with hazardous observations and provide information to System Operation from the field as requested. The following are examples of the types of issues spotters look for:

- Any active fire or smoke
- Any flash in the area near a powerline, substation, or transformer
- Sparking caused by powerlines making contact during high wind events
- Downed/broken/badly leaning poles
- Downed/broken powerlines
- Vehicle accidents involving poles or electrical equipment
- Loud noises near electrical equipment that follow a flash
- Vegetation contacting or at risk of contact with electrical infrastructure
- Airborne debris, especially, if debris is close to powerlines
- Inclement weather conditions upon arrival and any significant weather changes that might impact equipment and/or public safety
- Any calls or reports from third parties, the public or first responders about hazards (sparks, flashes or loud noises, poles down, lines down, etc.)

The Company deploys spotters during emergency events at locations based on information from National Weather Service alerts, which specify general areas for the expected event. On O'ahu, Maui and Hawai'i Island, some spotters are stationary where they have good vantage points, while other spotters are tasked with roving specified areas. Given the smaller workforce size, Moloka'i and Lāna'i use spotter crews that rove throughout the island during red flag events. Spotter locations can be adjusted throughout the course of the event as necessary. As the Company improves its situational awareness capabilities, it may be able to reduce the number of spotters deployed during red flag events.

3.2 Fast Trip Settings and Reclose Blocking

The Company is now implementing faster breaker trip operations. By tripping very quickly after a fault is detected, less energy will be delivered to the faulted area, reducing the potential for sparking conditions that can potentially lead to an ignition. Fast tripping also increases the chances of detecting and clearing faults that may have otherwise gone undetected under normal protection settings. Furthermore, with fast trip settings, substation circuit breaker/reclosers will open more quickly than most downstream fuses on the circuit. This will prevent downstream expulsion fuses from operating, thereby reducing the risk of sparks from these devices.[5] However, while these settings can reduce ignition risk, customers can expect longer duration and potentially more frequent outages than they have experienced in the past. As the Company builds more granular weather forecasting capability and situational awareness, it may be able to enable fast tripping with greater selectivity. Deployment of additional sectionalizing equipment could also allow the enablement and disablement of localized fast trip settings.

[5] See Section 5.4 which discusses the risks associated with expulsion fuse operation.

Reclose blocking procedures have also been implemented for all circuits within high wildfire risk areas, as well as all distribution circuits in medium wildfire risk areas. When reclosing is enabled, circuit breakers will open (de-energize) after a fault is detected and can then be closed back in (energized) – either through automated settings, or manually via SCADA – to try and re-energize the circuit. This leads to fewer and shorter outages in lower risk conditions when fault conditions clear on their own. By contrast, with reclosing blocked, the circuit breaker will instead open the circuit and remain open when a fault is detected. Blocking reclosing prevents circuit breakers from reclosing into a persisting fault condition that could lead to an ignition. Circuits with reclosing blocked will only be reclosed after inspections are completed and the cause of the fault has been fixed, the faulted section has been isolated, or the lines are found to be clear. This could result in more and longer sustained outages.

3.2.1 Implementation and Protocols

3.2.1.1 Fast Trip and Reclose Blocking Implementation

A policy of reclose blocking has been implemented Company-wide for all circuits in the currently defined high wildfire risk areas and distribution circuits in medium wildfire risk areas due to the current drought conditions and wildfire risks. Fast trip requires relay settings to be calculated based on the unique characteristics of each circuit. Once these settings are calculated, relay engineers program or set relays with the appropriate settings. Maui and Hawaiʻi Island implemented their relaying with the majority of the relays SCADA-enabled. This means the dispatchers can remotely enable and disable fast trip settings and auto-reclose blocking using the Energy Management System (EMS) for SCADA-enabled circuits. On Oʻahu, dispatchers have the capability to remotely enable and disable blocking of the auto-reclose function, but not fast trip settings. Thus, the relay engineers must also install a toggle switch at the substation transformer and a person at the substation is required to enable or disable the fast trip setting. Given the number of circuits in high wildfire risk areas, the Company expects to complete the fast trip installation in currently identified high wildfire risk areas by the end of 2024.

Due to current drought conditions and wildfire risks, the Company is keeping fast trip settings enabled in high wildfire risk areas, along with reclose blocking in both high and medium wildfire risk areas, even during non-red flag conditions. The Company plans to revisit this policy as its risk assessment capabilities mature and additional wildfire mitigation measures are implemented.

3.2.1.2 Restoration of Customers Following Blocked Reclose and After a Fast Trip

To minimize the risk of ignitions, the Company's current procedures provide that when circuits with fast trip and reclose blocking trip open, a visual inspection of the entire line must be completed before re-energization. This reduces the potential for re-energizing into a faulted condition that could cause an ignition. Without fast trip enabled, normal operation would allow faults to be cleared by downstream protection devices (e.g., fuses, line reclosers) which are located closer to the fault location, while leaving the remainder of the upstream circuit energized. This reduces the number of customers impacted by the outage and generally reduces the duration of the outage through faster isolation and restoration by field personnel. With fast trip settings enabled, the entire circuit would be de-energized upon a fault. Existing fault current indicators

(FCIs), which are designed to detect and provide a visual indication of the direction of a fault, will not operate fast enough and other protective devices may not operate, which means these visual indications may not be available to assist field personnel in their inspections. To aid troublemen in isolating fault locations, the Company is ordering and installing new FCIs that will operate quickly with the fast trip setting. This is described in Section 3.3 below.

Longer duration outages can occur if the condition that caused a fault cannot readily be determined. During more hazardous conditions (such as red flag conditions as determined and issued by the National Weather Service), the circuit may remain de-energized until red flag conditions have been cancelled by the National Weather Service. In cases where the risk may be considered lower, such as non-red flag conditions or favorable weather and fuel conditions, the Company may decide to deploy spotters, disable the fast trip setting for the circuit temporarily, and re-energize the circuit to find the fault with the existing downstream protection devices enabled. This could speed up the process of restoration.

3.3 Fault Current Indicators (FCIs)

In the immediate term, the Company will install new FCIs that operate faster and are able to coordinate with fast trip settings in strategic areas to help troublemen and system operators troubleshoot issues more efficiently in the field. With total circuit miles on circuits ranging from several miles to 30+ miles, FCIs that help field-personnel locate faulted areas are critical for safe and efficient fault location and restoration, and reducing risks in the field. FCIs will be installed in strategic locations: at the beginning of the circuit and in one-mile sections along the mainline, at switches, riser poles, inaccessible areas, and existing fuses. The Company began installing these new FCIs on high wildfire risk circuits in 2023 and will continue in 2024 and beyond. In the future, the Company plans to use smart FCIs with wireless communications that will provide likely fault locations remotely, further expediting restoration.

3.4 Detecting Broken Conductors

The Company is evaluating new protection methods to help clear faults quickly and to prevent energized lines from contacting the ground, including innovative methods to detect broken conductors. Broken conductor technology is intended to enable rapid detection of broken conductors to allow relays and other protective equipment to de-energize circuits before a broken conductor faults against a ground source, thereby significantly reducing the probability of becoming a source of ignition. The Company is pursuing federal funding this year under the Grid Resilience and Innovation Partnerships (GRIP) Program for a pilot to detect broken conductor on select transmission and distribution circuits in each county to evaluate the potential for larger-scale implementation.

Detecting broken conductors at the transmission level would require upgrading transmission relays to newer relays capable of enabling the new algorithms required to implement this technology. Most of the relays in transmission switching stations will also need to be upgraded in Maui County and on Hawaiʻi Island where loads are directly tapped off the transmission, and new breakers will also need to be installed.

Detecting broken conductors at the distribution level will require monitoring phase angles through synchronized measurements across the distribution circuit. This will require installing smart reclosers and phasor measurement units (PMUs) throughout a given circuit. All relays and sensors will need to be outfitted with GPS time clocks and have low-latency high speed communication – either radio or Private LTE (PLTE) – for the protection scheme to work. At the substation, relays capable of performing synchronized measurements will need to be installed along with a Real-Time Automation Controller (RTAC) to run the tripping algorithms. Additional relay replacements will also be required at existing line reclosers to install relays capable of functioning as PMUs.

3.5 Public Safety Power Shutoff (PSPS)

Depending on weather or other environmental conditions, Public Safety Power Shutoff (PSPS), or proactive shutdown of power, may be used as early as summer 2024 as a measure of last resort to help prevent utility-related wildfires and keep our communities safe. The Company is working to develop initial PSPS protocols and operational procedures as an early-stage iteration, which will evolve over time as more analytical, forecast, and situational awareness capabilities and wildfire mitigations are deployed. This will allow the Company to mature its PSPS plans to be more targeted. PSPS events will leave customers, including critical facilities and customers with special needs, without power, which brings its own risks and hardships. PSPS implementation, therefore, needs to proceed in a measured and thoughtful manner that accounts for and weighs the consequences of shutting off power. The Company will collaborate with the Hawaiʻi Emergency Management Agency (HiEMA), fire agencies, the Commission, and other key stakeholders across the state to develop and implement a community-focused PSPS plan that balances the consequences of utility-related wildfires against the public consequences of not having electricity. The Company aims to develop a robust customer and community notification process as part of its PSPS plan.

In the near term, it will not be feasible to implement PSPS in as targeted of a way as is currently done by California electric utilities after years of developing their programs and making necessary changes to their systems. Hawaii’s existing electrical systems provide fewer options for switching and alternative paths for the transmission, sub-transmission, and distribution systems. Greater flexibility would need to be provided through additional investments in automation and additional switches and circuit ties in order to implement PSPS shutoffs in a more targeted manner. Moreover, location-specific detection of weather and other environmental conditions, as discussed in Section 3.1.3, is not yet available in sufficient quantities to inform more surgical sectionalizing and PSPS deployments.

On Oʻahu, the leeward side is a high wildfire risk area where a large amount of the island’s generation is located. Bulk power is delivered through transmission lines from these generation resources into central Oʻahu, and then through the rest of the island. De-energizing these transmission lines would greatly impede proper generation dispatch and grid flexibility, which could easily lead to broader impacts to areas that are not high wildfire risk areas, and even island-wide outages.

Maui and Hawaiʻi Island have transmission lines that also serve customer load. De-energizing transmission lines in high wildfire risk areas would lead to extended interruptions for many customers, even if not in wildfire risk areas. There are also not many transmission options on these islands, so grid flexibility would be greatly reduced with the prospect of large-scale outages occurring.

Early stage PSPS protocols and operational procedures are being developed for potential implementation when hazardous conditions are identified. At the distribution level for all islands, PSPS outages would currently require entire distribution feeders to be preemptively shut off when hazardous conditions are identified. Certain feeders will need to be manually shut down at the substation where SCADA is not available and will therefore experience longer outages. Shutting off whole circuits will also affect many customers that are not in high wildfire risk areas until additional sectionalizing equipment and automation through an Advanced Distribution Management System (ADMS) is available in order to more surgically conduct a PSPS.

4 Inspection Plans

As discussed in Section 2, the Company has identified transmission, sub-transmission and distribution circuits within its high wildfire risk areas. The Company plans to perform both detailed ground inspections and drone inspections to identify issues requiring remediation and to support scoping of hardening efforts.

4.1 Detailed Ground Inspections

The Company has begun performing detailed ground inspections of circuits in high wildfire risk areas, including poles/structures, related hardware on the pole such as guy wires, anchors, crossarms, insulators, and conductors and shield wires. This effort includes completing condition assessments (e.g., pole and anchor condition) to identify poles and hardware for replacement, as well as gathering pictures and other information to inform immediate mitigation efforts or longer-term proactive hardening or re-design as discussed in Section 5. Company personnel or contractors will inspect each pole/structure in high-risk wildfire areas.

4.2 Drone Inspections

The Company has a fleet of drones and licensed operators that will perform inspections of assets in high wildfire risk areas. Drone inspections will capture high-definition imagery of poles and other circuit assets from above the structures, which will complement the information being collected from the detailed ground inspections. Drones can be an effective way to inspect pole assets from above to identify conditions that are not visible from the ground, and in hard-to-access locations. Hawaiian Electric is also considering utilizing aerial equipment such as a helicopter equipped with a high-definition camera to capture videos and pictures of utility assets, which can be zoomed in to review the condition of the assets. This technology may allow for quicker review of electrical assets. Drone inspections have begun and will ramp up through 2024.

5 System Hardening

5.1 Pole Replacement and Upgrades

In order to reduce the probability of pole failures that could lead to an ignition or potentially impede ingress/egress in an emergency, the Company plans to implement an aggressive two-pronged approach in high wildfire risk areas to: (1) replace or restore deficient poles and pole types with known issues, and (2) proactively harden (non-deficient) poles.

The first prong of the Company's pole replacement effort involves aggressively replacing or restoring poles with deficiencies or known issues in high wildfire risk areas. While the Company has ongoing system-wide programs to address deficient poles, the Company has been prioritizing deficient pole replacements in high wildfire risk areas since late 2023 and is increasing replacements in 2024. This includes poles that are identified for replacement or restoration through routine visual or intrusive inspections (i.e., pole test and treat program) or other means such as targeted detailed inspections. Additionally, the Company plans to replace certain types of poles that are known to have issues which could increase the potential for failure, such as gas treated wood poles (also known as Cellon poles) and deteriorated wood poles restored with a polymer filling process (also known as poly-filled poles). When poles are replaced, they will be brought up to current design standards and policies, which may result in wider and taller poles to meet strength and clearance requirements. In certain circumstances, deficient poles may be restored, instead of replaced, by reinforcing the existing pole with a steel truss to meet or exceed the original design strength of the pole.

The second prong of the approach involves proactive pole hardening to increase the wind speed rating of the Company's pole infrastructure in high wildfire risk areas. Prior to the adoption of National Electrical Safety Code 2002 (NESC 2002) by the Commission in 2007, transmission and distribution poles were designed to lower wind loading consistent with then-governing standards. As with the first prong above, poles identified for hardening will be replaced with poles that meet or exceed NESC 2002 wind loading requirements. These efforts are distinguished in that the driver for proactive pole hardening is to increase the wind rating of poles – which are not necessarily deteriorated or prone to failure under normal conditions – in order to reduce the probability of failure in high wind events. Proactive pole hardening will be applied on high-risk circuits starting in 2024. The Company also plans to begin identifying pole lines for hardening along limited egress routes near high wildfire risk areas starting in 2024.

5.2 Conductor Replacement

Smaller single-strand copper conductor has been identified as an elevated risk for failure, which can lead to downed conductors. These smaller conductors have lower tensile strength compared to the Company's standard aluminum conductor, and are also more prone to annealing and fatigue over time.

Recently, the Company has begun proactively replacing single-strand copper conductor, including in high wildfire risk areas such as Waianae and West Maui. The Company plans to ramp up these efforts in 2024, prioritizing replacements of the smallest conductor sizes: #8 and #6.

Line splices and temporary in-line disconnects are other potential points of failure that can lead to downed conductor. To reduce these risks, the Company plans to begin reconductoring line sections that have more than two splices on a given span and removing temporary in-line disconnects on lines in high wildfire risk areas starting in mid-2024.

5.3 Shield Wire Replacement

Deteriorated shield wire poses a risk of falling into the conductors below and causing sparks. The Company has been programmatically replacing shield wire on the 138kV system on O'ahu since 2010. Through its detailed inspections, the Company plans to begin assessing the shield wire on transmission lines on Maui and Hawai'i Island in 2024 and identify sections that require replacement.

5.4 Expulsion Fuse Replacement

Expulsion fuses were identified by the California Department of Forestry & Fire Protection (CAL FIRE) in their California Power Line Fire Prevention Field Guide as being a potential ignition risk and therefore subject to minimum vegetation management clearing requirements (PRC 4292). The Company engaged vendors that provide CAL FIRE approved fuse models to evaluate fuse technologies designed to reduce the potential for the release of sparks or hot material during operation. The Company recently selected two models that will be used across its service territories. The Company is currently working to update relevant engineering standards in order to begin implementation. The Company plans begin replacing existing expulsion fuses with these new models in mid-2024.

5.5 Lightning/Surge Arrester Replacement

Lightning/surge arresters were also identified by CAL FIRE in the California Power Line Fire Prevention Field Guide as being a potential ignition risk; therefore, the Company is evaluating lightning/surge arrester devices with arc or spark prevention mechanisms. While there are limited vendors that supply this type of technology, the Company is working with vendors to identify lightning/surge arresters that utilize spark prevention units that sense thermal overload and interrupt the flow of current. The Company plans to identify new standard lightning/surge arrester models and to begin replacements in mid-2024.

5.6 KPF Air Switch Replacement

KPF air switches were also identified by CAL FIRE in the California Power Line Fire Prevention Field Guide as being a potential ignition risk when they are used to break load, which is how these switches are currently used at Hawaiian Electric. The Company plans to begin replacing KPF air switches in high wildfire risk areas with CAL FIRE approved switches in mid-2024.

5.7 Targeted Re-Design of Spans

The Company is performing detailed engineering assessments of lines in high wildfire risk areas to identify potential risks to be addressed through re-design of spans. Implementation is planned to begin in mid-2024.

In high wildfire risk areas where there are concerns about swing shorts or conductor sag, the Company plans to deploy solutions such as the following options on a case-by-case basis: (1) decreasing span lengths through the placement of additional poles between existing spans, (2) reframing from horizontal to vertical framing, (3) staggering the middle phase conductor/insulator at the horizontal crossarm, (4) adding conductor spacers, and (5) installing longer crossarms.

In high wildfire risk areas, the Company plans to use double dead-ends poles every 5-10 spans where feasible to facilitate re-tensioning of conductor sag between poles, as well as to facilitate reconductoring (as discussed in Section 5.2) to remove splices or sleeves on conductor spans to reduce the probability of conductor failure.

5.8 Fire Retardant Mesh

To improve fire resilience of pole assets, new or replacement wood poles in high wildfire risk areas will be installed with a fire-retardant mesh that was field tested by the Company in a live-burn test in 2019.

6 Enhanced Vegetation Management

The Company continues to execute vegetation management efforts based on the current vegetation management procedures. Hawaiian Electric's vegetation management program focuses on preventative maintenance on overhead distribution and transmission lines. The program seeks to minimize line and facility contact with vegetation, and thus reduce fire risk, by pruning or removing vegetation within easements and County and State rights-of-way from the immediate vicinity of overhead lines. Generally, the Company's easements provide the right, but not the obligation to trim vegetation that is in the way of the Company's lines and facilities. The Company is evaluating options to implement vegetation clearing requirements similar to California Public Resources Code (PRC) 4292 for poles with electrical infrastructure identified as a potential ignition risk in the California Power Line Fire Prevention Field Guide, which was developed by the California Department of Forestry and Fire Protection (CAL FIRE), the California Public Utilities Commission (CPUC), and others. Figure 4 below replicates a figure in the Power Line Fire Prevention Field Guide that depicts PRC 4292 requirements.

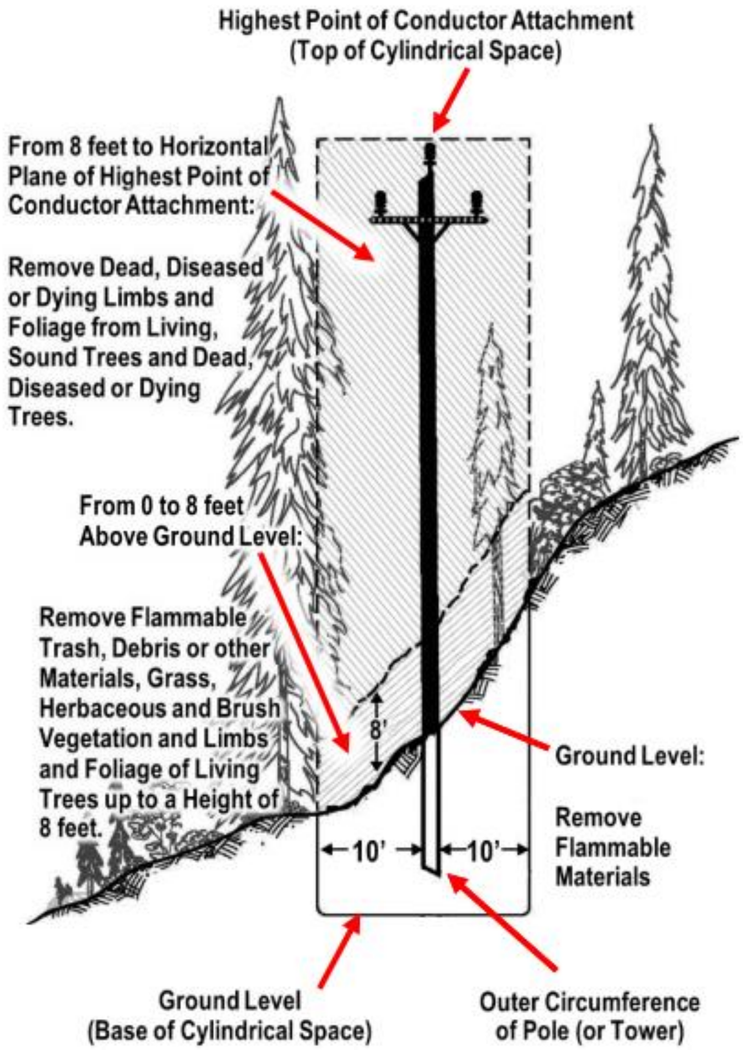

Figure 4– PRC 4292 Clearing Requirements

The Company's current practice is to allow overhanging tree limbs on distribution overhead lines as long as there is twelve feet of clearance from the lines and the limb is sound and appears in good condition. On transmission overhead lines, the practice is similar, but overhanging tree limbs are trimmed to provide twenty-five feet of clearance from the lines. The Company is reviewing this practice and considering removal of all limbs overhanging transmission and distribution lines.

Currently, if the Company's employees or contractors identify and report a tree that appears to be at risk of falling onto the Company's power lines because it is dead, decayed, damaged, uprooted or otherwise structurally weak (also known as a hazard tree), the Company's system arborist would assess the tree to determine whether it presents a hazard that should be mitigated outside of the regular maintenance cycle. If a tree were determined to present a hazard, the Company would take appropriate steps to mitigate the hazard through removal and/or pruning, including seeking necessary landowner permissions to remove trees outside of the Company's easements and rights-of-way.

The Company plans to expand hazard tree removal efforts starting in 2025 as part of the T&D Resilience Program. In addition, the Company plans to work towards securing wider rights-of way and enhanced rights of access for clearing vegetation. Efforts will also include informing, educating, advocating, and assisting landowners and others on the need to reduce fuels, replace invasive species with drought tolerant vegetation, and the use of fire breaks and fuel breaks.

7 Updating the Wildfire Safety Strategy

By the end of 2024, the Company plans to file with the Commission a comprehensive 2025-2027 WSS, which will detail the Company's plan to reduce the risk of wildfires associated with utility infrastructure.[6] This multi-year WSS will be developed with input from key stakeholders and communities. For example, the Consumer Advocate, HiEMA, fire agencies, Hawaiʻi Wildfire Management Organization (HWMO), various state and county agencies, the University of Hawaiʻi, communities, peer utilities with extensive wildfire mitigation experience, parties to Docket No. 2022-0135, and many other key stakeholders.

In April, the Company plans to host a two-day Wildfire Safety Symposium to engage a cross-section of external stakeholders and partners to inform the Company's WSS. Separately, the Company plans to establish a Wildfire Safety Working Group (similar to the IGP Resilience Working Group), offering a forum for ongoing engagement and feedback from key stakeholders and subject matter experts in the utility wildfire mitigation space. The Company also plans to engage communities in affected areas to share the Company's wildfire mitigation plans and obtain feedback to inform its WSS.

To develop the WSS, the Company plans to develop and utilize wildfire risk modeling tools to better understand the wildfire risk areas, risk of ignition, and impact of wildfire consequences to communities. Based on data developed through these wildfire risk modeling tools, the Company will consider various wildfire mitigations for each elevated risk area to reduce the risk of wildfires, including enhanced inspections and vegetation management, system hardening, grid design, situational awareness, and operational strategies and practices, including updated plans to implement and minimize the consequences of PSPS for customers. Location-specific wildfire mitigations will be prioritized according to their risk reduction potential. The WSS may also include additional components incorporating any wildfire mitigation plan legislation that is enacted following the current legislative session.

[6] The Company notes that this timeline is subject to change should the scope of the WSS be increased or modified by law or Commission order.