WILDFIRE MITIGATION AND RESPONSE PLAN

2022

PSE PUGET SOUND ENERGY

CONTENTS

PSE PUGET SOUND ENERGY

1. INTRODUCTION

Safety is Puget Sound Energy's (PSE) top priority. PSE is an "all-hazards" company – our natural gas and electric systems must serve our customers through a range of weather and environmental conditions, such as high winds, flooding or earthquakes, as well as human-caused hazards such as vehicle accidents or cyber threats. Emergency preparedness and response is at the core of our services, and we view meeting the growing challenge of wildfires as an extension of that responsibility.

Over the past decade, wildfires have emerged as a significant public health and safety concern for much of the Western United States. As a result of climate change and chronic drought conditions, the risk of wildfire now extends beyond historically active areas into communities experiencing significant growth and development. While the severity of these conditions varies greatly across the West, and even within individual states, the growing risk warrants appropriate assessment and mitigation by utilities and their regulators, as well as broader community and stakeholder engagement. A comprehensive, geographically specific, and data driven approach that mitigates wildfire hazards while maintaining the reliable delivery of energy is critical.

This Wildfire Mitigation and Response Plan (Plan) documents our strategies, programs, procedures, and specific actions for responding to wildland fires. It incorporates best practice models from risk management, operations, emergency management, communications, training and continuous improvement, with the ultimate priority being the safety of our communities and customers we serve and for the personnel that serve them. This Plan will also continue to evolve as our collective understanding of wildfire risk evolves and new risk reduction strategies and technologies emerge.

Included as Appendix A to this Plan is a summary of the Plan by strategic element, which includes recent actions, accomplishments, and next Plan milestones. Significant changes to this Plan from the previous Plan are focused on maturing risk assessment and data capture capabilities, as well as providing increased detail regarding our overall strategy and increased details regarding how PSE will be implementing this Plan. This year's changes include:

- Progress developing and implementing a public safety power shutoff (PSPS) plan and related operations and communications processes for future use.
- Meetings scheduled this summer with potentially affected customers and communities as well as with County Emergency Management staff in areas of higher wildfire risk.
- Additional information on PSE's wildfire risk reduction measures that have been completed and those that are planned.
- Increased staffing dedicated to PSE's wildfire mitigation efforts.
- Updates and improvements to the risk model, operational procedures and situational awareness strategies.

The following table represents a summary of the capital investments made in 2020 and 2021 as well as the planned investments through 2025 that will have reliability benefits as well as reduce wildfire risks and improve response activities, as described in this Plan.

Table 1: PSE's capital investments 2020-2025 with reliability and wildfire risk reduction benefits

	2020		2021		2022		2023		2024		2025	
MITIGATION TYPE	**COUNT**	**$**	**COUNT**	**$**	**COUNT**	**$**	**COUNT**	**$**	**COUNT**	**$**	**COUNT**	**$**
Fault Reduction	**4**	**$ 3,700,000**	**16**	**$ 14,900,000**	**13**	**$ 11,900,000**	**15**	**$ 12,800,000**	**27**	**$ 34,000,000**	**17**	**$ 23,400,000**
Covered Conductor	2	$ 400,000	1	$ 1,000,000	2	$ 5,900,000	2	$ 2,400,000	8	$ 10,400,000		
UG Upgrade					1	$ 1,800,000	1	$ 2,800,000				
UG Conversion			2	$ 8,800,000	-	-	1	$ 1,500,000	3	$ 13,600,000	4	$ 18,800,000
OH Upgrade	1	$ 2,000,000	1	$ 200,000	1	$ 2,100,000	1	$ 3,500,000	2	$ 4,900,000		
UG Capacity							1	$ 500,000				
OH Capacity	1	$ 1,300,000	1	$ 2,200,000					2	$ 1,700,000		
Pole Replacement			11	$ 2,700,000	9	$ 2,100,000	9	$ 2,100,000	11	$ 2,400,000	11	$ 2,400,000
Copper Replacement									1	$ 1,000,000	2	$ 2,200,000
Fault Protection	**14**	**$ 2,700,000**	**12**	**$ 2,400,000**	**18**	**$ 4,200,000**	**52**	**$ 11,500,000**	**18**	**$ 6,400,000**	**16**	**$ 6,400,000**
Wildfire					2	$ 2,300,000	1	$ 2,000,000	1	$ 2,500,000	1	$ 3,000,000
Substation SCADA	11	$ 1,500,000	4	$ 600,000	7	$ 700,000	19	$ 3,300,000	13	$ 2,700,000	15	$ 3,400,000
Recloser	1	$ 200,000	5	$ 400,000	7	$ 600,000	20	$ 2,600,000				
Distribution Automation	2	$ 1,000,000					12	$ 3,600,000	4	$ 1,200,000		
Transmission Automation			2	$ 1,400,000	2	$ 600,000						

Appendix B provides a view of these investments by business plan over various timeframes and estimates the number of projects on wildfire circuits for the outer years, as well as the proportion of the planned investments for those programs that will provide wildfire risk reduction benefits.

2. FRAMEWORK

2.1. PURPOSE

The Plan documents PSE's strategies, operational procedures, and system investment approaches that enable PSE to identify, mitigate, and respond to evolving wildland fire risks that pose a risk to our services and communities. The Plan establishes safety as the first priority and describes methods in which PSE addresses situational awareness, notification, preventative measures, and response and recovery actions specific to wildfire risks.

2.2. SCOPE

PSE operates approximately 2,400 miles of transmission and 10,000 miles of overhead distribution circuits, including 340,000 poles, and 430 substations in Washington State. PSE's Plan monitors and considers all the service territory but focuses on defined areas of wildfire zones and, through risk modeling, on areas where communities and assets are at the greatest risk of an occurrence. PSE's reliability and resiliency investments throughout the territory help to improve wildfire resilience, but a keen focus on the circuits within higher wildfire risk areas is most valuable for this Plan.

This Plan details the actions that PSE is currently performing to address wildfire risks in its service territory. It describes the steps that PSE is taking to improve the electrical system and the operational response to changing conditions to better manage this evolving risk. Consistent with PSE's continuous improvement model, Plan adjustments will be made periodically as new information and experience is learned from our internal stakeholders, industry partners, regulatory bodies, customers, and communities. This Plan also includes PSE's plans for communicating and working with customers and communities to ensure safety and reliability.

2.3. OBJECTIVES

The objectives of this Plan are as follows:

- Uphold safety for the communities and customers we serve, and for our employees.
- Know the long-term and real-time wildfire risk in PSE's service territory through development and maturity of the appropriate assessment tools
- Implement mitigation solutions that balance the risk of wildfire with safe and reliable energy delivery by prioritizing higher risk assets and geographic areas.
- Leverage existing grid modernization programs to deliver benefits for wildfire resiliency.
- Incorporate communication with fire agencies into operational processes to ensure the safety of PSE employees during an active fire event.
- Inform customers of PSE's wildfire preparedness measures and our communication protocols in the event of a specific wildfire risk.
- Collaborate with customers and communities in the ongoing development of the Plan, particularly as it relates to ensuring customer safety and reliability.
- Continuously improve this Plan through learning from others and deploy best practices as they become helpful to PSE's territory and risks.

2.4. ELEMENTS

The following elements focus PSE's approach in delivering the Plan objectives:

- **Situational Awareness:** PSE's wildfire risk modeling combined with weather forecast monitoring enables grid operators to proactively identify emerging risks associated with fire weather. Enhanced inspection technology pilots are under way to evaluate how new tools might provide a more detailed assessment of equipment condition and vegetation encroachment.
- **Fault Reduction:** Decrease the number of faults along PSE's system by prioritizing reliability programs that strengthen PSE's infrastructure within higher wildfire risk areas in order to reduce the potential for wildfires.
- **Fault Protection:** Reduce the duration and extent of faults along PSE's system. Adopt common fault protection tactics including altering automatic reclosing and protective device settings and installing covered conductor.
- **Operational Procedures and Emergency Response:** Operation within wildfire zones and during wildland fire weather events may be different than traditional operating procedures, increasing the need to predict conditions and respond proactively as well as coordinate emergency response differently and with many other entities.
- **Communication and Outreach:** : Effective external and internal communication is essential for coordinated prevention and response to wildfires. PSE will host several community engagement sessions in higher wildfire risk areas to inform and develop unique community- and customer-centric actions and wildfire mitigation tools, such as a PSPS plan. In addition, PSE works with land management groups ahead of fire season and fire response personnel during wildfire events. Customer communication follows established protocols from storms and other emergencies.

2.5. PERFORMANCE METRICS

PSE is currently developing performance metrics and tracker measures relative to the Plan's progress and wildfire risk reduction, as well as to report on outcomes of wildfire-related projects and process improvements. Performance metrics currently under consideration include:

Situational Awareness: Real-time situational awareness is enhanced through operator dashboards utilizing public risk and weather datasets. System Operators can use these dashboards to trigger operational decisions such as non-reclose operation of distribution circuits, staging first-response personnel, and required visual inspection during restoration efforts. For the 2022 wildfire season, PSE will also be implementing enhanced incident tracking capabilities to inform development of this potential performance measurement.

- Dashboard uptime
- Number of dashboard improvements
- Number of pre-season inspections performed on time
- Number of agency coordination events
- Miles of WUI (increasing over time)

Fault Reduction and Protection: Core aspects of PSE's broader grid modernization efforts aim to enhance asset maintenance and replacement as well as improve circuit performance by increasing system protection and decreasing system faults. This may include insulator replacement and bonding, covered conductors, targeted undergrounding, spacers, splices, and conductor spacing. Preventing outages through system hardening investments is directly tied to reducing wildfire risks.

- Number of reclosers installed in support of Supervisory Control and Data Acquisition (SCADA) enablement
- SCADA upgrades to circuit breakers
- Distribution Automation schemes installed
- Overhead equipment failure tracking
- Distribution grid hardening projects completed
- Number of fiberglass arms installed
- Arc-suppression fuses installed
- FR3 t ransformers installed
- Miles of bare conductor upgraded
- Miles of conductor undergrounded
- Miles of covered conductor installed
- Number of PSPS deployed

Enhance Vegetation Management: PSE's approach includes enhanced vegetation management within higher wildfire risk areas, which includes expanding vegetation clearances, review of vegetation clearing frequency, increasing visual and drone inspections, and implementing an expanded off-right-of-way danger tree removal plan.

- Number of grow in outages
- Number of limb outages
- Number of fall-in outages from outside the ROW
- Number of hazard trees removed
- Number of trees trimmed
- Planned and completed mileage for vegetation management

Operational Procedures and Emergency Response: PSE's operating procedures in higher wildfire risk areas and during wildland fire weather events may differ from traditional operating procedures, as there is an increased need to predict local environmental conditions and proactively coordinate emergency response differently and with many other entities.

- Number of PSPS deployed
- Number of overhead equipment failures
- Number of system operations actions taken from dashboard use

Communication and Outreach: Key communication strategies to communities and customers before and during wildfire-related disruptions will use a variety of traditional and digital media, depending upon the nature of the disruption, to provide updates and information. These communications strategies include:

- Number of community meetings per year
- Number of informational channels and media deployed
- Number of meetings with fire agencies
- Number of meetings with forest land agencies

Continuous Improvement and Program Effectiveness: PSE is also developing metrics to evaluate all the combined performance measurement categories to develop appropriate wildfire risk mitigation processes discussed above. These metrics include:

- Number of ignition events
- Number of arcing events
- Acres burned
- Industry standard practices deployed
- Number of root cause analyses performed

2.6. EXECUTION AND CONTINUOUS IMPROVEMENT

2.6.1. CHRONOLOGY OF THE PSE WILDFIRE PROGRAM

Appendix C is a Chronology of the development of the Wildfire Program at PSE. This details the steps PSE has taken since the 2018 Camp Fire, which was the deadliest and most destructive wildfire in California's history. It documents the development and maturation of PSE's Plan and supplements the additional actions that are discussed throughout this Plan.

2.6.2. STAFFING

For 2022, PSE has added two additional staff positions dedicated specifically to the planning, administration, and continuous improvement of PSE's wildfire mitigation efforts. This includes a Wildfire Mitigation Program Manager and Asset Management-Wildfire Engineer. In 2022, PSE is also adding a Data Scientist. These positions will ensure year-round progress on improvements in the different elements of this Plan.

PSE's Wildfire Mitigation Program Manager is responsible for leading PSE's ongoing development and implementation of our corporate wildfire risk reduction strategies and assembling and leading multi-disciplinary teams to ensure mitigation implementation aligns with overall corporate objectives. Additional responsibilities of this role include:

- Establishing governance and charter for the program.
- Managing wildfire program budgets.
- Establishing and maintaining documentation that demonstrates the effectiveness of our wildfire investments.
- Prioritization of resources needed to deliver the program's objectives.
- Facilitating communication and outreach activities with stakeholders including customers and Washington Utilities and Transportation Commission regulatory staff about the wildfire program and other wildfire risks, mitigation, and other associated issues.
- Engaging in industry working groups and workshops on related wildfire related topics.

PSE's Asset Management-Wildfire Engineer is responsible for:

- Supporting the development of holistic strategies and processes for reducing wildfire risk and improving reliability and resiliency.
- Providing technical expertise and guidance to the Wildfire Mitigation Program Manager.
- Assessing equipment reliability and performance needs from an asset management perspective.
- Developing and implementing asset management strategies for long-term system hardening in higher wildfire risk areas.
- Engaging with the industry and vendors to align with best practices and evaluate the potential for integrating new technologies or approaches to reduce wildfire risk.
- Working with standards to improve equipment specification and exploring new technologies.
- Defining and reviewing metrics by which PSE can quantify the value of decisions based on risk, performance, and cost.

PSE's Data Scientist position will support PSE's wildfire mitigation efforts. This person is responsible for:

- Leveraging data, internal and external, to develop different operational models for a predictive approach to wildfire mitigation.
- Collaborating with different external entities to ensure PSE is on the front lines of latest wildfire mitigation efforts.
- Developing visualization for real-time monitoring and evaluation of data models.

In addition to these new positions, many internal departments at PSE have been and will remain actively involved in wildfire risk mitigation.

2.6.3. LESSONS LEARNED

PSE will incorporate lessons learned from previous wildfire seasons and interactions with regulators, customers, peer utilities, industry groups, and others. Examples of lessons learned during the 2021 wildfire season that are being incorporated in 2022 include:

- Situational awareness and formalized processes are vitally important as quick action is needed due to short timeline/ notice of Fire Weather Watches and Red Flag Warnings. Improvements made for 2022 include the addition of more granular wildfire hazard potential (WHP) data provided by the United States Forest Service (USFS) for the annual Wildfire Risk Model, formalization of fire weather monitoring by System Operators, and upgrades to the Daily Wildfire Dashboard.
- Proactive action in advance of wildfire season (equipment inspections, vegetation trimming and removal) provides a certain degree of confidence heading into wildfire season and should be conducted every year. PSE will conduct pre-wildfire season inspections, vegetation management, and equipment maintenance again in 2022 and each year moving forward, targeting higher wildfire risk areas based on our annual risk assessment.
- Continuous improvement methodology requires year-round attention to iterating and improving wildfire tactics and strategies. For 2022, PSE has added staff dedicated to the execution and improvement of this Plan.
- Formalized daily ignition/fire event-logging practices are needed for identification of trends that may need further analysis and correction. PSE is developing improved event-logging procedures that will be implemented prior to the 2022 wildfire season.
- Continued participation in industry groups and collaborative workshops with industry associations is beneficial as we continue to advance PSE's wildfire mitigation strategies.

3. PSE WILDFIRE RISK

3.1. WASHINGTON STATE FIRE ENVIRONMENT

Washington is not immune to the effects of climate change, which are projected to increase in nature over the next several decades. Summers are projected to be drier and warmer, and extreme weather events may become more likely. Changing weather patterns can shift tree pests and disease as well, causing additional fire load in forests and in the adjacent wildland urban interface (WUI).

Increased development in areas exposed to wildfire risk means that the potential consequence of wildfires on human populations is increasing. Human settlement and forest management practices have led to increased fire suppression activities allowing for additional accumulation of fuel.

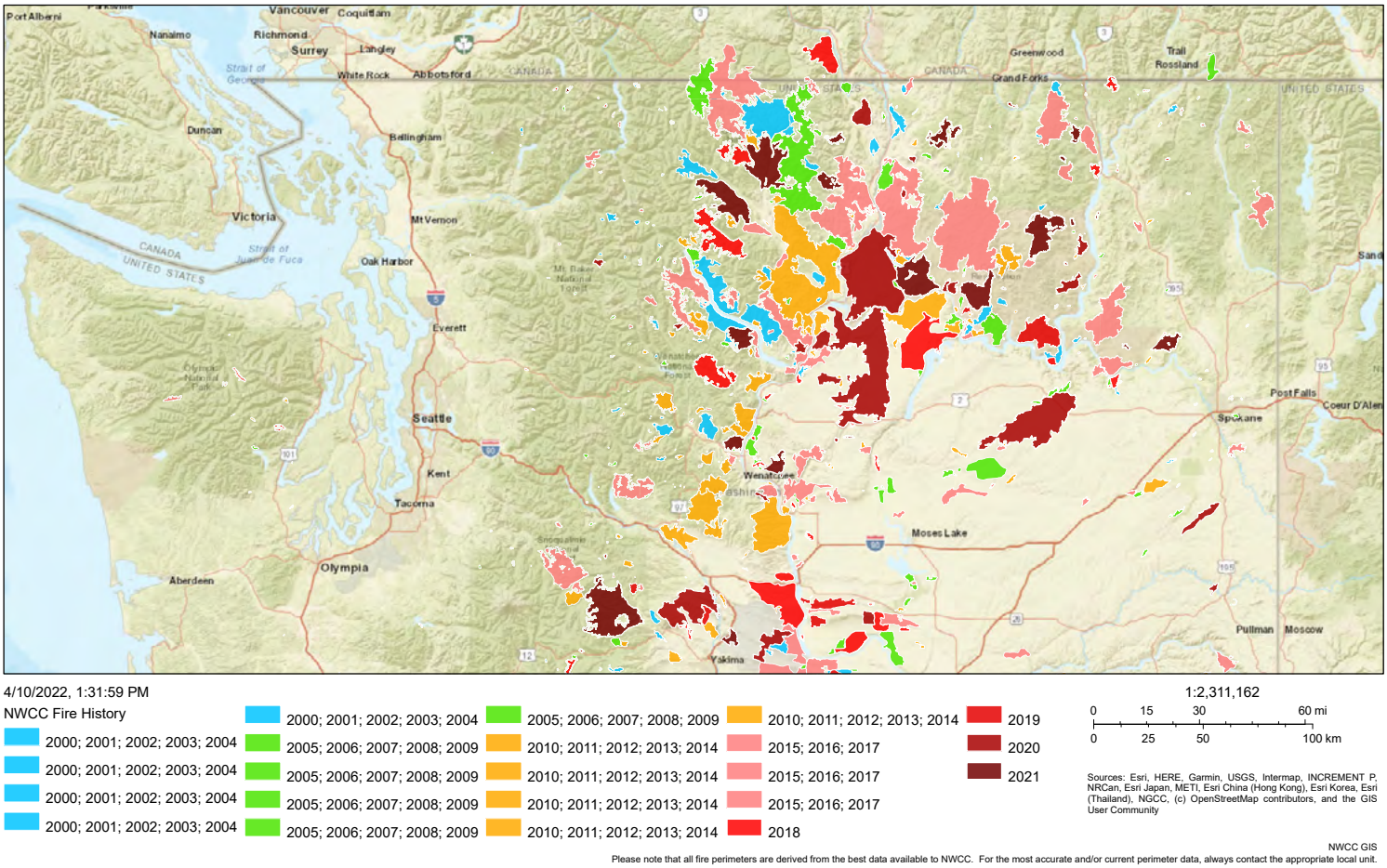
As PSE continues to implement and mature this Plan, an increasingly granular understanding of evolving wildfire risk within our service territory will help PSE to take action in an efficient and effective manner. Western Washington has not historically been prone to frequent wildfires, and as changing conditions shift the risk landscape across PSE's service territory, frequent iterations and improvements to existing risk modeling will be vital to the timely deployment of mitigation tactics and system hardening projects.

3.1.1. HISTORICAL WILDFIRE ACTIVITY IN PSE'S SERVICE TERRITORY

The majority of PSE's electrical distribution and transmission system is located in Western Washington. PSE also operates electrical distribution and transmission systems in Kittitas County. Large wildfires in Western Washington are quite rare due to the different environmental conditions on each side of the Cascade Mountain range as shown in Figure 1 and Figure 2.

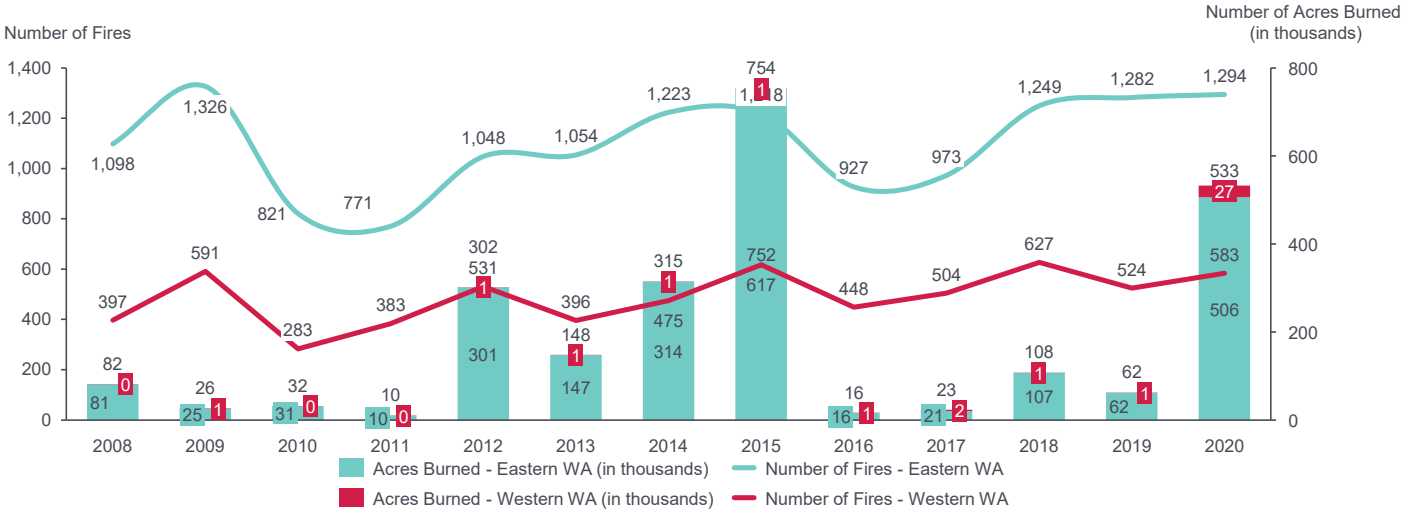
These differing environmental conditions have influenced not only PSE's approach to wildfire, but also that of neighboring utilities in the Puget Sound area. Winter weather traditionally has been the major driver of PSE's asset maintenance and investments due to the damaging impact of winter windstorms.

Figure 1: Large wildfires west of the Cascades are rare as compared to Central Washington



https://gacc.nifc.gov/nwcc/information/firemap.aspx

Figure 2: Western Washington and Eastern/Central Washington have different fire environments



Note(s): Wildfires were classified according to DNR regions with the Northeast Region and Southeast Region being Eastern Washington. The Northwest Region, South Puget Sound Region, Pacific Cascade Region, and Olympic Regions were classified as Western Washington. Source(s): Washington Department of Natural Resources

PSE has a historical lack of wildfire-related loss events in its service territory, but recent events impacting utilities throughout the Western U.S. demonstrate that climate conditions are shifting the risk landscape, even in those areas that were not previously are considered at risk. Accordingly, assessing where higher wildfire risk areas exist has been a priority at PSE for several years. As PSE continues to refine and improve wildfire risk modeling, additional granularity will enable more geographically specific identification of areas within PSE's service territory that are subject to increasing risk due to climate conditions. This improved understanding of the shift in risk through PSE's service territory will ensure effective deployment of grid modernization projects and operational actions designed to mitigate the risk of a wildfire.

3.2. PSE RISK ASSESSMENT AND MODELING

3.2.1. WILDFIRE RISK ASSESSMENT

PSE's risk assessment process results in an understanding of where the risks of fire are highest due to the burn potential in specific areas as well as the interaction of vegetation contacting PSE equipment and other potential equipment failures that may entail spark ignition potential.

Infrastructure and asset type

The wire specification (type and size) of circuit conductors and overhead equipment is one variable in assessing risk of a potential fault. The various types of conductors used throughout PSE's service territory have been priority rated as low, medium, and high. Grid modernization and hardening aid in reducing spark ignition potential.

The vegetation maintenance cycle is also used to determine the risk of a vegetation contact fault. Routine inspection and maintenance activity minimizes the risk of vegetation growing or falling into a circuit.

Fire Ignition

PSE employs the USFS WHP map (also known as the burn potential map) to determine the risk of heat (a spark or arc) developing into a fire. More overhead exposure in these higher burn potential areas is considered by PSE to be a higher overall risk. Combining the wire specification risk and the burn potential severity gives an overall risk for an ignition potential which could lead to a wildfire event.

Wildfire Propagation

For a fire event to spread into a wildfire, wind and terrain/fuels are the biggest drivers. The USFS burn potential map considers the fuel types and the terrain already, so PSE then adds several weather datasets to include the wind component.

Wind speed is a major driver of Red Flag Warnings issued by the National Weather Service (NWS), along with low humidity. PSE uses these two conditions as the trigger for operational decisions regarding how to configure the electrical system during high fire risk days.

Consequence

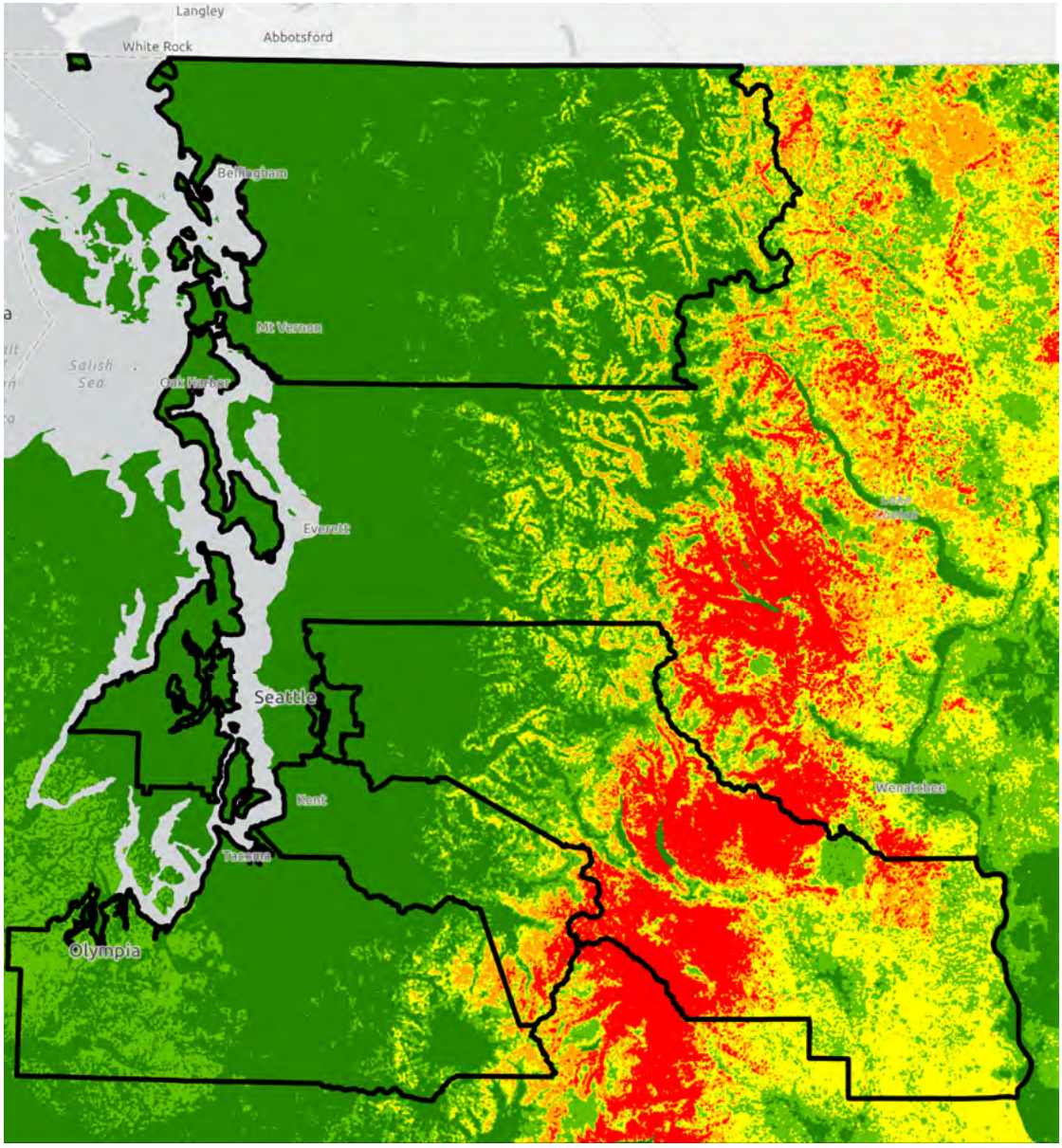
WUI is used to determine the possible consequences of a large wildfire from the perspective of threat to people and property. As development continues to increase and homes are built at the edge of and inside densely forested areas, people and structures are at increased risk of wildfire. WUI provides a relative risk weighting factor for these areas.

To identify the specific areas of PSE's system that have a higher risk of a wildfire event, it is necessary to overlay several different geospatial datasets with PSE's asset data. The primary datasets PSE uses to identify likelihood of ignition and consequence of a wildfire event are the WHP/burn potential and Burn Probability datasets created by the USFS, and the WUI dataset created by the Washington State Department of Natural Resources.

3.2.2. WILDFIRE HAZARD POTENTIAL

WHP mapping is a geospatial product produced by the USFS Fire Modeling Institute. This dataset depicts the relative potential for wildfire that would be difficult for suppression resources to contain, and combines information on wildfire likelihood, intensity, and fuels/vegetation as shown in Figure 3.

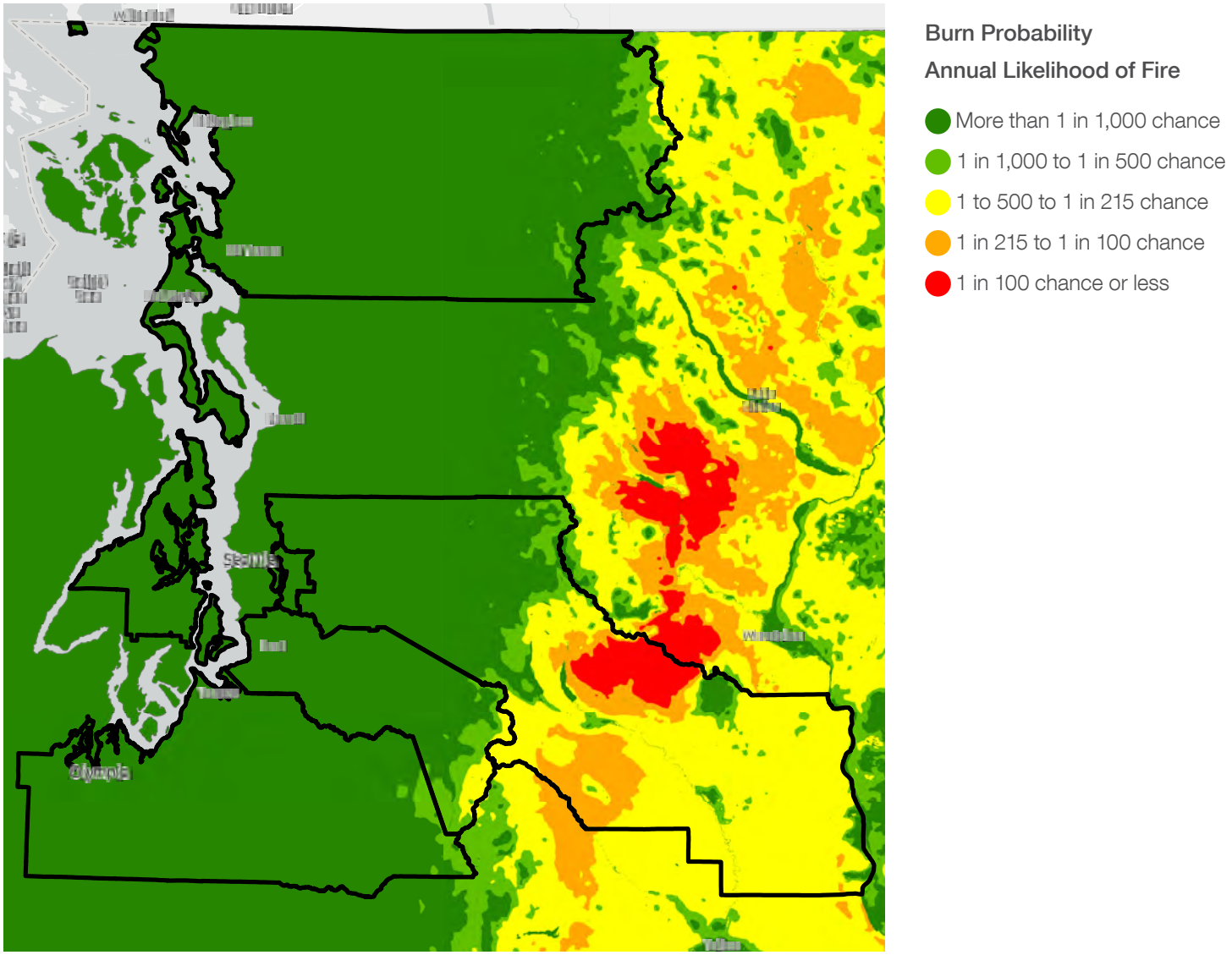
Figure 3: WHP map for PSE's territory



3.2.3. WILDFIRE BURN PROBABILITY

Wildfire Burn Probability mapping is a geospatial product produced by the USFS. This dataset depicts the annual probability that wildfire will burn in a specific location as shown in Figure 4.

Figure 4: Burn probability map for PSE's territory

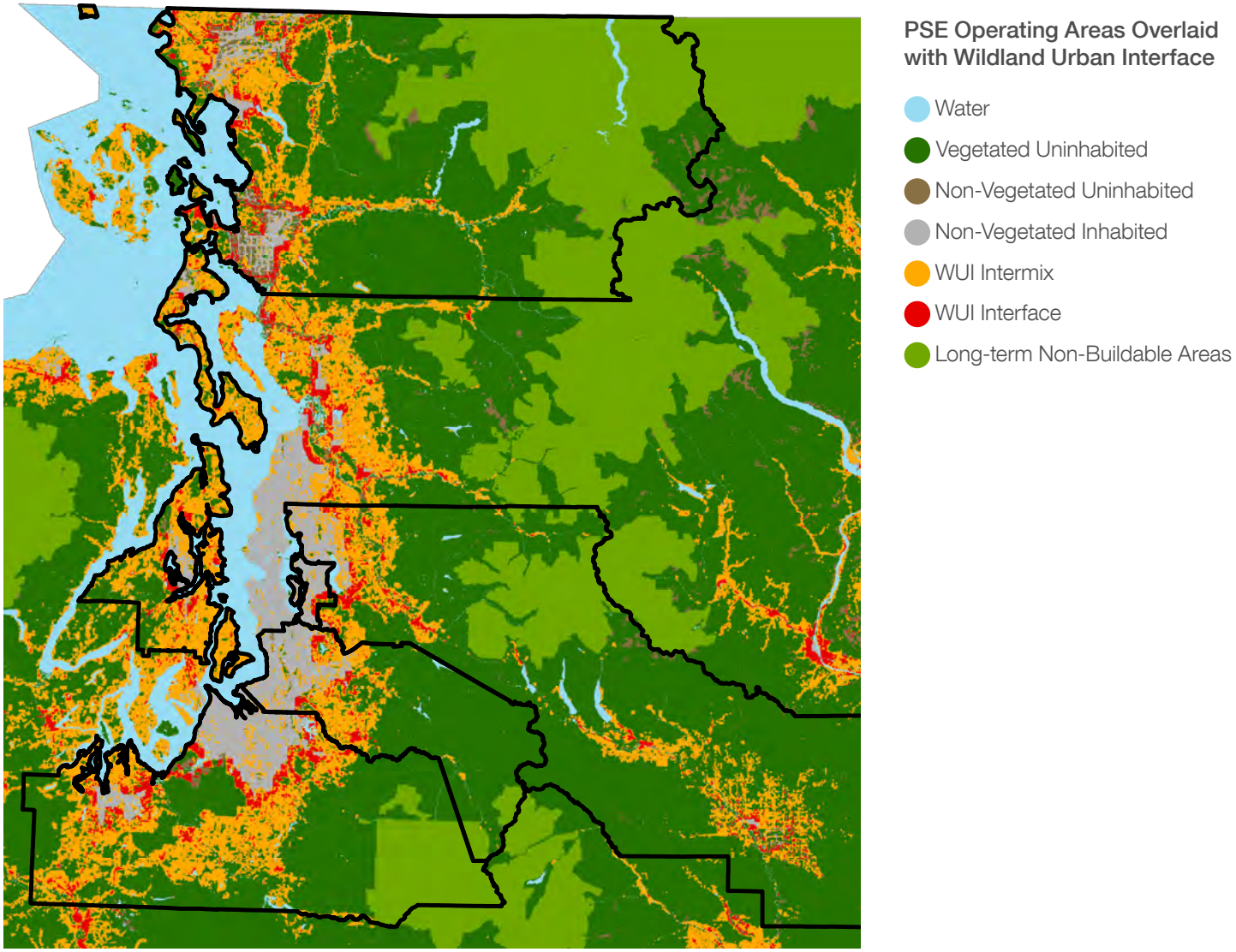


3.2.4. WILDLAND URBAN INTERFACE

The WUI is the zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Communities adjacent to and surrounded by wildland are at varying degrees of risk from wildfire.

The Washington State Department of Natural Resources has identified the WUI areas. Figure 5 is the map of the WUI overlaid with PSE's service territories in black outlines.

Figure 5: WUI map of PSE's territory



3.2.5. WILDFIRE RISK MODELING

PSE's wildfire risk model is similar to other wildfire risk models employed by peer utilities in that risk is quantified by considering the likelihood of a wildfire event multiplied by the impact of a wildfire event in a particular area of PSE's service territory. PSE uses WHP to quantify the likelihood of an ignition propagating into a wildfire, Burn Probability to quantify the likelihood of a wildfire occurring during the year, and WUI as a proxy for the possible impact of that wildfire to personal safety and damage to property.

The geospatial datasets quantifying WHP, Burn Probability, and WUI are then overlaid with PSE's geospatial datasets of overhead electrical assets to determine the areas in which each type of risk exists. Generally, higher lineal footages of overhead conductors in the different risk classes will result in a higher risk score being assigned to that distribution circuit or transmission line.

In addition to WHP, Burn Probability, and WUI, PSE also utilizes additional asset data to further refine and differentiate the risk at the distribution circuit or transmission line level. PSE's wildfire risk model takes vegetation cycle into account and incorporates the types of electrical conductor used for construction.

3.2.6. ANNUAL RISK RATING

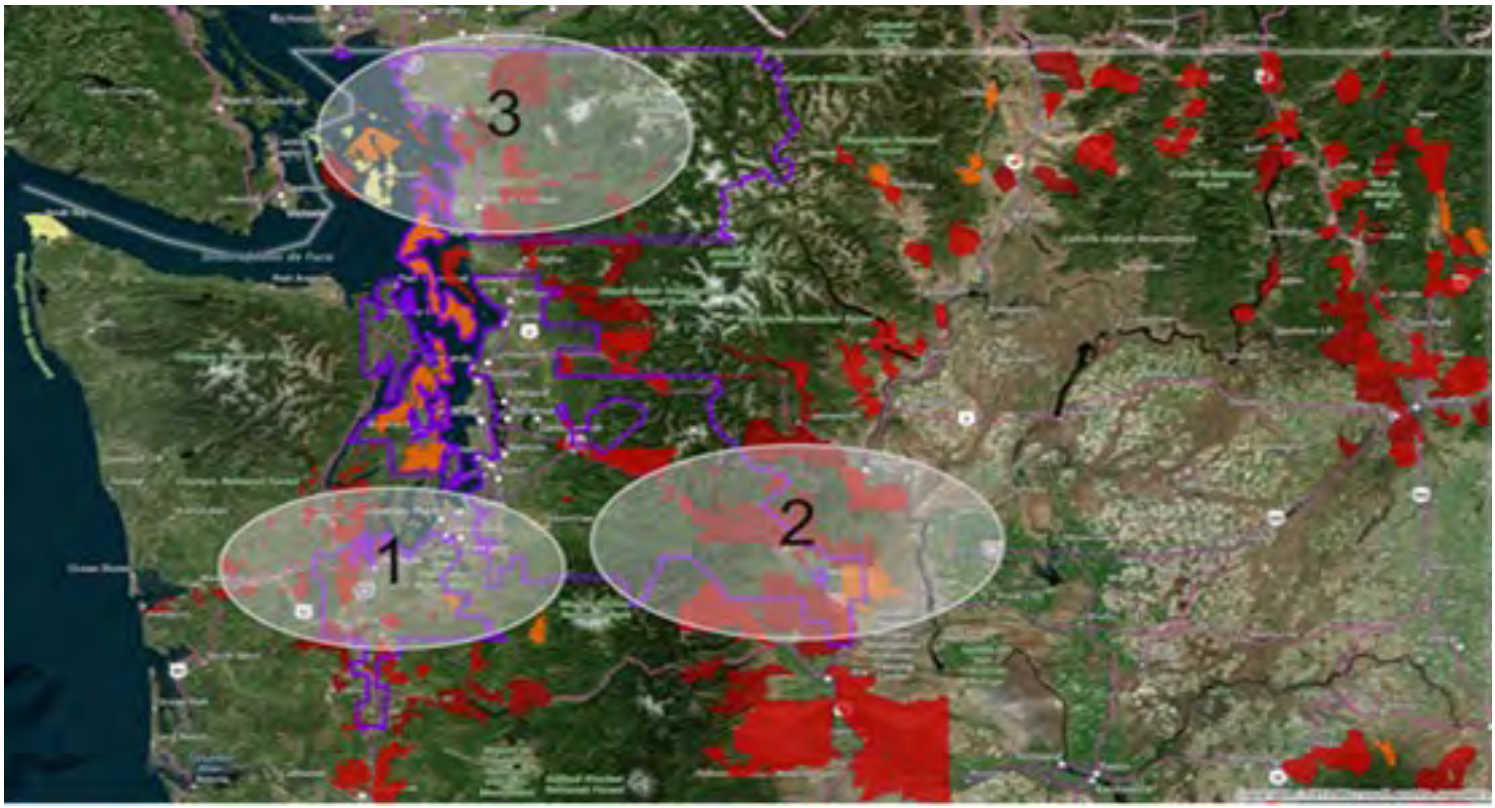
The final output of PSE's wildfire risk model results in risk ratings at the distribution circuit and transmission line levels that can be used to adjust Plan activities including prioritize inspections, maintenance, upgrades, and operational protocols efficiently. Unsurprisingly, the majority of higher risk circuits are located on the east side of the Cascade Mountains in Kittitas County – but the risk assessment also identifies a discrete amount of higher risk circuits located in Western Washington as well.

The circuit risk ratings incorporate all the aforementioned characteristics with weighting factors applied. PSE concentrates most risk mitigation activities in areas with a moderate or higher WHP, as indicated by USFS data sets, and uses Burn Probability and WUI to further prioritize work within these areas. These risk characteristics are applied in a geospatial map dashboard discussed in Section 4.1.2 of this Plan.

PSE has identified three areas of concern in its service territory with higher wildfire risk, which make up less than one percent of PSE's transmission and distribution system. These areas (A, B, and C) are depicted on the map below.

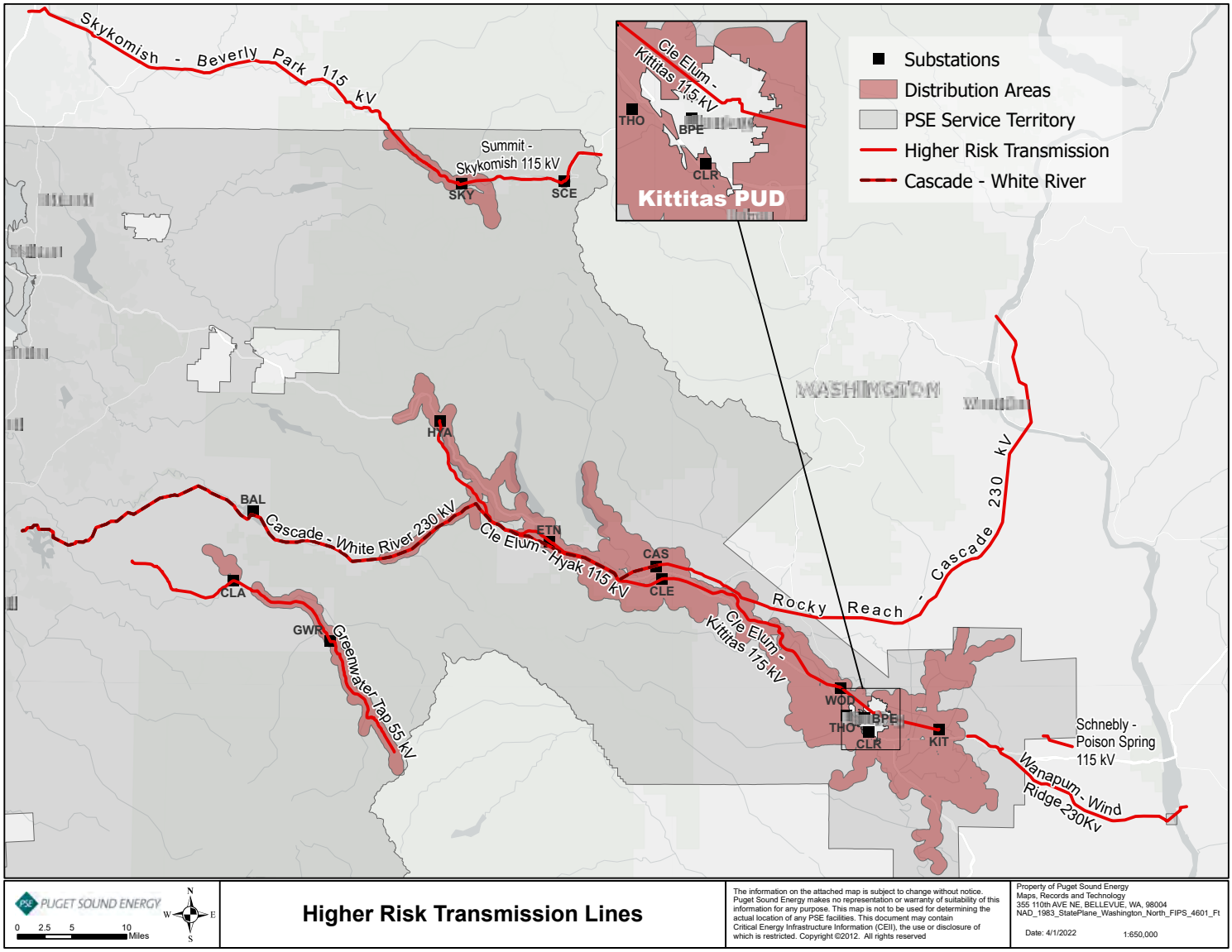
Area B covers PSE's service territory in Central Washington and comprises the majority of the higher risk distribution circuits and transmission lines in PSE's service territory as shown in Figure 7. Areas A and C also have areas with wildfire risk profiles that are higher than the remainder of PSE's service territory, primarily due to the amount of line miles in WUI areas (rather than, for example, their burn potential or probability). The risk profile for Area A has also declined in PSE's 2022 circuit risk rankings due to an updated WHP dataset created by the USFS that created more granularity. Moderate WHP values were separated into low and moderate WHP values, which resulted in this area moving further down in the risk rankings as compared to PSE's 2021 risk assessment.

Figure 6: Areas with higher wildfire risk in PSE territory



Within these three areas of concern, PSE has identified specific areas of its service territory that are at higher risk of wildfire. As illustrated in Figure 8, which shows higher risk transmission lines within PSE's system, the majority of these transmission lines are located on the eastern side of the Cascade Mountains. However, some higher risk lines are located partially or entirely on the west slopes of the Cascades. Distribution circuits emanating from the substations also generally fall into the higher risk wildfire category, although specific rankings vary slightly depending on the percentage of circuit miles that intersect with different WHP, Burn Potential, and WUI values.

Figure 7: Example of higher risk lines in PSE's territory



4. WILDFIRE MITIGATION AND RESPONSE PLAN ELEMENTS

4.1. SITUATIONAL AWARENESS

4.1.1. STRATEGIC APPROACH TO SITUATIONAL AWARENESS

Situational awareness encompasses tools and technology that convey a comprehensive understanding of real-time wildfire risk throughout PSE's service territory. Conducting a thorough risk assessment creates a baseline of relative wildfire risk in different geographical areas, which then serves as a backdrop for fire weather events that escalate the chances of wildfire spread.

Emerging technologies such as artificial intelligence (AI)/machine learning and advanced image processing can then further refine real time risk conditions to a granular level, which provides System Operators with the information needed to execute mitigation actions in advance of a fire weather event.

Table 2: PSE's strategic approach to situational awareness

APPROACH	APPLICATIONS AND BENEFITS	IMPLEMENTATION CONSIDERATIONS
Wildfire Risk Model	Mapping wildfire risk in the vicinity of utility assets is essential to informing operational decisions for mitigating wildfire risk.	Risk modeling improvements are a foundational component of wildfire prevention, and PSE continues to improve and iterate on its wildfire risk model. For 2022, additional granularity for WHP has been incorporated into annual risk modeling. Moving forward, fire propagation modeling will also be incorporated to allow prioritization of hardening projects at the sub-circuit level.
Fire Weather Monitoring and Risk Mitigation	Publicly available fire weather forecasts can contribute to situational awareness and help utilities prepare for imminent fire weather conditions. Technologies that provide real-time awareness of current weather serve to further inform decision making during active fire weather events.	Fire weather forecasts are typically generated for broad swaths of PSE's service territory, which creates difficulty in identifying specific operational mitigation approaches. Real-time weather monitoring stations can provide more granular information but will require substantial investment for sensor systems and meteorologists to interpret the data.
Inspection Technology	Remote sensing and imagery technologies provide valuable information about utility assets and the surrounding environment that is not available via traditional inspection techniques. PSE's current technology evaluations include: 1. Infrared (IR) and thermal imaging 2. LiDAR (Light Detection and Ranging) 3. Drone deployment of IR and LiDAR vs. traditional aircraft approach 4. Satellite imagery for real time evaluation of large portions of PSE's service territory	IR and thermal inspections are a new and untested approach to early identification of failure methods. LiDAR provides very granular data, but it is expensive and data processing can take months. Both technologies are usually deployed via helicopter, which creates additional constraints. PSE is currently evaluating the viability of deploying both technologies via drone, which should improve efficiency. PSE is also piloting a satellite imagery project combined with AI/machine learning technology.
Pre-Wildfire Season Inspections	Traditional inspection techniques identify short term mitigation opportunities prior to the start of fire season.	PSE conducts ground and aerial inspections of assets in higher fire risk areas for the purpose of identifying defective equipment or encroaching vegetation that requires attention prior to fire season.

4.1.2. DAILY WILDFIRE RISK DASHBOARD

To give System Operators awareness of which circuits represent a higher risk for wildfires, PSE has developed a real-time dashboard to represent the distribution overhead system overlaid with WHP, which "depicts the relative potential for wildfire that would be difficult for suppression resources to contain, based on wildfire simulation modeling." This map contains five classifications: very low, low, moderate, high, and very high. For the 2022 Daily Wildfire Risk dashboard, the risk is calculated as described below.

Relative risk scores range from zero to five, where the circuit with the highest risk receives a score of five. Each circuit's score is determined by three factors: vegetation management, environmental, and consequence. The vegetation management score is based on the cycle length and year last managed. The environmental score is determined by the length of overhead wire intersecting moderate, high, or very high WHP, and weighted by WHP severity as well as the type of conductor. The consequence score is also determined by length of overhead wire intersecting different weighted consequence risks such as WUI.

This annual score is added to real-time wind conditions to give system operators an indication of conditions in the field. This information is used to assess risk and make operational decisions. Currently, National Oceanic and Atmospheric Administration (NOAA) Fire Weather & Dry Thunderstorms, the NWS Fire Watches & Red Flag Warnings, and the Northwest Predictive Services (NWPS) from the Northwest Interagency Coordination Center contribute to the daily assessment. NOAA and NWS both contribute 40 percent of the risk score, and the NWPS contributes the other 20 percent of the score. Risk is determined by the length of overhead wire intersecting any of the areas of concern from any of these sources and weighted by the severity of the concern.

Image 1: Daily Wildfire Risk Dashboard

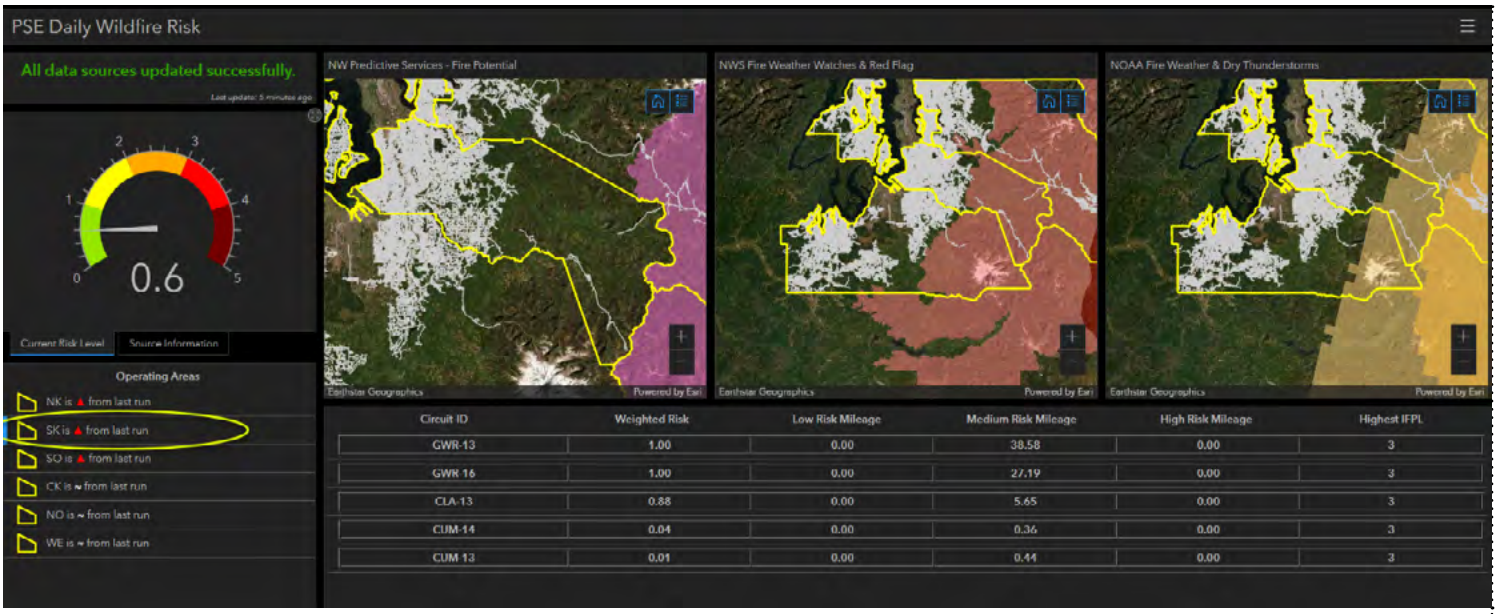


Image 2: Daily Wildfire Risk Dashboard with fire weather warnings

4.1.3. FIRE WEATHER MONITORING AND RISK MITIGATION

PSE's Daily Wildfire Risk Dashboard gives PSE's real-time operations team visibility to forecasted and real time fire weather conditions throughout PSE's service territory. This situational awareness is then focused to a more granular identification of risk analysis based on the routing of overhead electrical infrastructure within the higher risk geographical areas. Operational risk mitigation actions are established within PSE's wildfire mitigation operational procedures, as further defined herein, and are based on the risk indicators from the Daily Wildfire Risk Dashboard.

During the months of June through October, fire weather conditions may be elevated in PSE's service territory. PSE System Operators monitor fire weather forecasts within PSE territory , identify any anticipated fire weather conditions that meet the criteria of defined action thresholds, and communicate the anticipated fire weather conditions as defined by operating procedures.

Fire Weather Conditions

The following fire weather conditions will require PSE's real time operations teams to consider changes to protection schemes or other actions to mitigate the possibility of an ignition event:

- **Fire Weather Watch:** Issued to alert fire officials and firefighters of potentially dangerous fire weather conditions within the next 24 to 36 hours. A Fire Weather Watch will turn into a Red Flag Warning 12-24 hours before the forecasted fire weather conditions are expected to occur.
- **Red Flag Warning:** Issued to alert fire officials and firefighters of potentially dangerous fire weather conditions within the next 12 to 24 hours.

Actions to Prevent Ignition

In the event of a Red Flag Warning in addition to forecasted winds in a higher risk portion of its service territory, PSE's operational procedures may trigger one of several different actions, which may include the following:

- **Selective De-energization:** De-energizing sections of transmission lines that will not result in a loss of service to customers.
- Disabling automatic switching schemes on higher-risk transmission lines.
- Halting remote/manual line testing practices on higher-risk transmission lines without first performing a complete field patrol by qualified electrical workers.
- **Recloser-Blocking:** Disabling automatic reclosing functions of protective devices located on higher risk transmission and overhead distribution lines.
- **Instantaneous Trip:** Enabling of instantaneous trip settings on protective devices to ensure immediate fault isolation with no intentional time delay.
- **Work cancellations:** Evaluate cancellation of scheduled customer work and construction activities in affected areas.

4.1.4. IGNITION AND FIRE RELATED EVENT TRACKING

As PSE prepares for the 2022 wildfire season, additional operational procedures are being developed to ensure that timely, consistent, and easily retrievable documentation is available for events where PSE personnel have identified the presence of a likely ignition or fire.

One of PSE's lessons learned from the 2021 fire season is that event logs should separate out events that are specific to wildfire risk reduction. Developing specific procedures for fire-related event logging will enhance PSE's ability to report on wildfire season experiences, identify trends for correction, and improve situational awareness for planning and maintenance engineers.

While transmission and distribution logging procedures may vary slightly due to the use of different outage management systems, the new procedure is anticipated to be be similar for both groups of operators. Specifically, operators may:

- Develop dedicated identifying codes within the Outage Management System platform for a variety of scenarios in which field personnel have identified the presence of arcing energy or signs of a fire.
- Identify the equipment/device involved in the event.
- Ensure event logs are stored in such a manner that data is easily retrievable and able to be analyzed and incorporated into future PSE wildfire mitigation and response plans in a more granular fashion.

Wildfire specific logging procedures are currently in development and are anticipated to be deployed to production prior to the 2022 wildfire season.

4.1.5. ENHANCED INSPECTION TECHNOLOGY

PSE is currently evaluating several emerging technologies and the possible application for wildfire preparedness and resiliency.

- Aerial inspection methods such as LiDAR are common in the utility industry already, but these methods are usually leveraged for vegetation management and engineering activities. LiDAR can be a valuable tool, but it typically requires the use of an aircraft and the associated data processing is often time consuming.
- Thermal/IR inspections have the potential to identify failing insulators by picking up heat signatures or coronas from electricity tracking from conductors to other parts of the structure. This technology is very new, and it can be deployed via aircraft or ground-based vehicles.

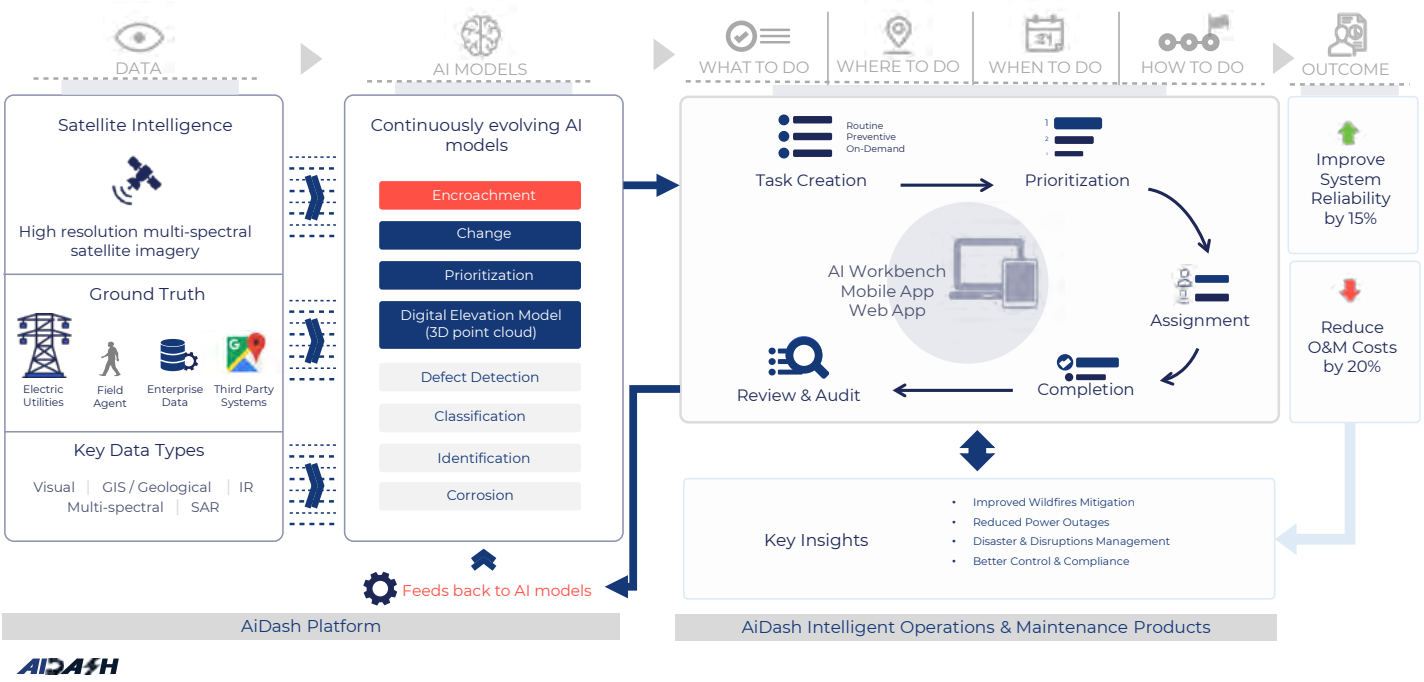
To address the challenges of aircraft deployment and data processing time, PSE has used a drone capable of carrying LiDAR, Thermal/IR, and HD camera packages. This drone, combined with a data processing solution pared down to an "a la carte" approach for the specific application of data collection, greatly reduces the cost of inspections and speeds up data processing time. Additionally, it may allow repeatable and routine data collection for the purposes of developing growth models to further improve prioritization and increase situational awareness in higher fire risk areas.

LiDAR/IR/HD Camera drone compared with normal 8 MP camera drone

In 2022, PSE is also conducting a pilot project to evaluate the use of satellite imagery combined with machine learning and artificial intelligence. The goal of this project is to enable faster and more efficient assessments of large portions of PSE's overhead system (approximately thousands of miles at a time). This technology is advancing very rapidly, and while image quality just a few years ago did not have the granularity necessary for wildfire mitigation purposes, the newest offerings have accuracies of less than a foot; and they are continually improving. Additionally, the satellite cameras use color spectrums not visible to the naked eye, which can identify trees stressed by drought before an inspecting arborist would be able to detect a change in the foliage of the tree.

PSE is conducting the pilot project for satellite imagery analysis on higher wildfire risk distribution circuits and transmission lines, as identified by PSE's wildfire risk model, specifically with the intent of deploying this technology for the purpose of wildfire risk reduction. If successful, this product will have application in not only the identification of specific areas to target for wildfire-targeted vegetation management, but also for quality control and documentation purposes.

IVMS Solution Overview



4.1.6. PRE-WILDFIRE SEASON INSPECTIONS

PSE conducts several types of inspections on higher risk areas prior to the start of wildfire season (generally accepted in Washington State as July 1). These inspections are planned by PSE Asset Management and executed by PSE's Electric First Response and Vegetation Management groups. These inspections are conducted with the purpose of identifying situational conditions that may have changed from the previous inspections which could be related to trees and brush, asset health and location, new structures or encroachments, accessibility, and egress, new or replaced infrastructure, and surrounding community changes.

Qualified electrical workers and certified arborists conduct these inspections primarily from the ground, and sometimes aerially, for hard-to-reach areas, such as PSE's cross-country transmission lines. Mitigation measures that are identified to are completed prior to fire season. For example, equipment issues found are submitted to PSE's Engineering department, and any imminent concern is addressed immediately. Also, any vegetation that has potential to fall or has grown or is predicted to grow into conductors is trimmed or removed as well.

4.2. FAULT REDUCTION

Fault reduction strategies are designed to reduce wildfire risk by prioritizing reliability programs that strengthen PSE's infrastructure in higher wildfire risk areas to decrease the number of faults that may cause a potential ignition event.

Table 3. PSE's strategic approach to reducing faults

APPROACH	APPLICATIONS AND BENEFITS	IMPLEMENTATION CONSIDERATIONS
Enhance Vegetation Management	Vegetation Management activities targeted specifically at wildfire prevention can reduce limb and tree caused faults. Pre-fire season inspections identify vegetation that may encroach on conductors during the summer growing season. Targeted off right-of-way tree removal provides benefits for both fire mitigation and reliability.	PSE has submitted a business case as part of its 2022 Multi-Year Rate Plan (MYRP) to the Washington Utilities and Transportation Commission proposing the implementation of a targeted hazard tree removal program (TreeWatch) that would be leveraged in higher wildfire risk areas. Implementation of this program would include application of new remote sensing technologies and data collection and analysis tools.
Public Safety Power Shutoffs (PSPS)	De-energizing electrical systems can prevent ignition events.	PSPS is an extremely complex and impactful mitigation strategy for wildfire, which requires development of substantial planning, operations, and communications protocols, and can result in extended outages for customers. In 2022, PSE has initiated the planning and customer engagement processes necessary to develop a PSPS plan that can be executed in a manner that minimizes impacts to customers and communities in higher wildfire risk areas.
Deploy Covered Overhead Conductors	Covered conductors (tree wire) can reduce faults from limbs and animals. Tree wire has less probability of arcing when contacted by external sources as compared to bare conductor	PSE has proposed as part of its 2022 MYRP to continue the mature program to replace bare conductor with tree wire for the purposes of improved reliability. This program will be leveraged to focus on higher wildfire risk areas for the prevention of arcing events that could lead to an ignition. Implementation currently includes 12 circuits in higher wildfire risk areas with tree-wire projects.
Strategic Undergrounding	Underground lines are not likely to trigger a wildfire event, unless there is an equipment failure in an access enclosure or above ground transformer.	Undergrounding lines can reduce the chance of an outage caused by external sources such as tree failures. There are currently 10 undergrounding projects in higher wildfire risk areas as submitted with the business case for the 2022 MYRP.
Asset Management	PSE's asset management approach for reliability purposes offers additional benefits for wildfire mitigation.	Numerous business cases presented as part of the 2022 MYRP comprise the wildfire asset management strategy. Every circuit undergoes a pole inspection on a 10-year cycle. See section 4.2.4 for additional Asset Management strategy.

4.2.1. ENHANCE VEGETATION MANAGEMENT

Vegetation related wildfire risk in PSE's service territory differs between Central and Western Washington. Central Washington is more sparsely treed than Western Washington, but it has more days with elevated fire weather conditions. Additionally, Central Washington experiences more wind in the summer than Western Washington, which generally translates to a higher wind threshold for tree or other vegetation failure.

Because of the different environmental conditions between these two areas of PSE's service territory, strategies for reducing wildfire risk due to vegetation also differ. Central Washington has less risk of whole tree failure simply because of the reduced exposure and because of the wind hardening effects of the trees that are in the vicinity of PSE's system. Western Washington has many more trees in proximity to the lines, and whole tree failure along with limb outages are not only more common than in Central Washington, but also much more difficult to mitigate due to tree density.

From an annual inspection and off-cycle trimming perspective, the risk mitigation approach for Central Washington and Western Washington is the same: inspect higher wildfire risk areas every year prior to the growth season and trim or remove any tree that poses a risk of growing or falling into the conductors in that year.

Where risk reduction strategies and actions will differ is in the hazard tree approach and funding prioritization given to the two areas. The following subsections describe PSE's approach to pre-wildfire season vegetation management activities as well as a longer-term grid hardening strategy that would have benefits for wildfire risk reduction.

4.2.1.1. PRE-WILDFIRE SEASON TRIMMING AND REMOVAL

PSE conducts pre-wildfire season vegetation inspections and any follow-up work prior to June 1 each year. These inspections are conducted on the higher wildfire risk distribution circuits and transmission lines as identified by PSE's most recent risk assessment for wildfire. Any trees that could encroach on live conductors during the summer growing season are trimmed back to ensure clearance from conductors for the entire growing season. In early 2021, PSE also focused on hazard tree removal for the pre-wildfire season vegetation inspection and remediation removing 473 trees and trimming 1,692 trees that inspectors identified to be at risk of contacting overhead conductors during the summer growth season.

Conducting annual inspections on distribution circuits and transmission lines augments PSE's standard vegetation management practices for reliability, and it is focused on the upcoming wildfire season and on the higher risk distribution circuits and transmission lines. Distribution circuits have vegetation management conducted every four or six years (four years for urban areas, six for rural areas) for reliability purposes, and the vegetation inspection is done at that time. Annual inspections in higher wildfire risk areas exceed historical practices.

4.2.1.2. HAZARD TREE REMOVAL

Prioritizing the removal of hazard trees in higher wildfire risk areas is approached differently than PSE's normal historical practices for reliability-focused hazard tree removal. For reliability, this activity is typically targeted at the areas of PSE's service territory that have the most tree related outages, which would be on the west side of the Cascade Mountains, where wildfire risk and tree related outages correlate well.

PSE's assets in Central Washington typically perform well from a tree-related outage standpoint as compared to the rest of PSE's system. Therefore, targeting hazard tree removal in Central Washington on a regular basis to reduce wildfire risk differs from PSE's historical practices and is above and beyond previous hazard tree removal (TreeWatch) programs focused on reliability.

With PSE's robust tree trimming plan, less than ten percent of outages are caused by trees within the right-of-way. Inspecting and trimming trees on an annual basis in higher wildfire risk areas ensures that trees within the right-of-way do not contact electrical conductors and cause an outage which could also result in an ignition.

However, most of the tree-caused outages are from trees that fall in or have branches that break from beyond the right of way. PSE is increasing the scope and effort of hazard tree removal in the coming years through an updated TreeWatch plan. TreeWatch addresses hazard trees that are on private property, generally beyond PSE's 12-foot public right-of-way.

PSE's current TreeWatch plan and operations and maintenance expense level is the on-going legacy the TreeWatch plan deployed between 1999 and 2005 that invested approximately $43 million through a deferred operations and maintenance cost recovery mechanism to focus on hazard tree removal for the purpose of improving reliability. TreeWatch reduced vegetation related outages by 22 percent over the life of the program. Refreshing PSE's TreeWatch plan, as PSE has introduced in the 2023-2025 MYRP, would improve reliability and resiliency by addressing these at-risk trees. Preventing tree-related contacts will prevent outages, reducing the risk that a tree failure will cause an ignition event resulting in a wildfire. TreeWatch will also help to remove "cycle buster" trees underneath electrical conductors that grow quickly enough to potentially contact conductors between maintenance cycles.

PSE estimates that the enhanced TreeWatch program could avoid vegetation related outages of approximately 24 percent for a subset of circuits with higher wildfire risk.

4.2.2. PUBLIC SAFETY POWER SHUTOFF

PSE is in the exploratory phase of developing a PSPS plan that will reflect the wildfire risks in PSE's service area based on the specifics of the system topography, geographic area, and impacts on ingress and egress. The PSPS plan will consider potential impacts to communities of not having power, which brings other risks and hardships, particularly for vulnerable communities and individuals. The PSPS plan will also incorporate lessons learned from other utilities that have implemented PSPS plans. As described in section 6 of this Plan, PSE will engage with potentially affected communities and customers in higher wildfire risk areas of PSE's service territory to solicit valuable community feedback that will inform development of PSPS-related procedures and communications. The first community engagement session will be held in Kittitas County on June 8, 2022.

4.2.2.1. History of PSPS in California

Over the last decade, California, as well as much of the Western United States, has experienced record-breaking wildfires. These fires have resulted in devastating loss of life and billions of dollars in damage to property and infrastructure. Electric utility infrastructure has historically been responsible for less than 10 percent of reported wildfires; however, fires attributed to power lines comprise roughly half of the most destructive fires in California's history. In response, an effort to reduce the risk of fires caused by electric infrastructure was developed involving temporarily turning off power to specific areas, which is called a Public Safety Power Shutoff (PSPS).

In 2012, the California Public Utilities Commission (CPUC) gave electric utilities the authority to shut off electric power to protect public safety. This allows the energy companies (San Diego Gas and Electric, Pacific Gas and Electric, Southern California Edison, Liberty, Bear Valley and PacifiCorp) to shut off power for the prevention of fires where strong winds, heat events, and related conditions are present.

In 2017, fires raged in Santa Rosa, Los Angeles, and Ventura, making it one of the most devastating wildfire seasons in California's history. In response to the 2017 wildfires and Senate Bill 901, the CPUC revised earlier guidelines on the de-energization of power lines and adopted the current set of PSPS guidelines in 2020 with provisions for COVID-19 measures. The current PSPS guidelines in California direct the electric utilities to more actively and holistically account for the needs and input of the Access and Functional Needs (AFN) community, including vulnerable populations and current and potentially eligible medical baseline customers.

4.2.2.2. PSPS Planning

Key elements of the PSPS plan that PSE is developing will include a static risk model, situational awareness to forecasted and real-time fire weather conditions, customer education and communication strategies, and documented operations procedures that will ensure appropriate and consistent actions that seek to balance meaningful risk mitigation relative to the potential negative consequences and risks of a shut-off.

Robust risk modeling and situational awareness, along with careful system re-configuration steps, are critical to balance the negative impacts and risks to customers experiencing a PSPS. These negative impacts may include disruption of essential electrical power supply to health care and long-term care facilities, community cooling centers, essential power for residential customers dependent on oxygen, communication infrastructure, internet service, wastewater systems, irrigation, firefighting resources, and traffic control, which can affect access and egress during a fire. Another reason to minimize the size of the outage is that re-energization following a PSPS requires the de-energized system to be inspected in its entirety before the de-energized lines and facilities can be safely re-energized. The inspection is necessary to ensure that no damage has occurred to the system that would compromise its integrity, safe operation, and safe re-energization. Therefore, the larger the area of the PSPS, the longer it takes to patrol, and the longer customers are without essential energy service. PSE will continue to work with state and local partners to fund opportunities to create the necessary granular and dynamic risk models and local weather forecasting tools that other jurisdictions have created to enable utilities to understand ignition potential and wildfire propagation based on real-time conditions and forecasted weather.

Due to the potential negative impacts to customers of a PSPS, it is important to provide appropriate notification to customers of a potential or impending PSPS. As noted in section 6 of this Plan, both communications and real-time operations tools and processes will need to be developed and additional staff resources allocated to PSPS communications. This will be part of our PSPS planning process.

PSE will be hosting community engagement meetings for wildfire preparedness and mitigation during the summer of 2022 in higher wildfire risk areas. The first of these meetings will be in June 2022. This meeting, which will be held in Cle Elem, Washington on June 8 , 2022, has been designed to educate customers about our specific wildfire risk reduction efforts in Kittitas County—a higher risk wildfire area in PSE's service territory. Through a facilitated conversation, PSE will also gather feedback from our community partners and customers on potential future wildfire risk mitigation measures, including the development of our PSPS plan. This collaborative meeting will serve to further inform PSE on the adverse impacts that would be experienced by our customers and communities during a PSPS and help us begin to identify solutions to potentially address those adverse impacts. To facilitate the design of an effective PSPS plan, PSE will also be using the meeting as an opportunity to obtain customer feedback on communication and notification preferences, as well as asking customers to update their contact information to tailor potential PSPS communications strategies.

4.2.3. DEPLOY COVERED OVERHEAD CONDUCTORS AND STRATEGIC UNDERGROUNDING

PSE has programs that improve reliability and have wildfire risk reduction benefits. These programs are described in this section and the benefits of the different approaches for wildfire risk reduction are described in Table 2: Fault Reduction.

In addition to PSE's long history of addressing the "areas of greatest reliability concern" as required by WAC 480-100-393(3)(a), in 2017 PSE formalized a focus on 135 circuits that historically had poor reliability performance with high customer minutes of interruption (CMI) and high circuit System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) performance associated with non-major event days.

This became the Worst Performing Circuit (WPC) plan. Different reliability strategies are applied to these worst performing circuits, including tree wire, underground conversions, overhead rebuilds, and adding new feeder ties until the circuit improves by 50 percent. Covered conductor (CC), commonly called tree wire, has been deployed in PSE's distribution system since the mid 1990s. CC helps reduce the frequency of overhead distribution line outages and arcing during storm conditions when the tree limbs contact the lines by providing a layer of insulation around the conductor.

The Targeted Reliability Business Plan included in PSE's MYRP supports distribution electric reliability needs that result in solutions that have high positive benefit-cost ratios. This plan includes overhead or underground rebuilds, Tree Wire upgrades, underground conversions, feeder ties, root cause analysis identified improvements, and other reliability improvements such as investment in mobile generation. This is a programmatic plan to improve the customer reliability experience across PSE's approximately 965 distribution circuits outside of the 135 WPCs. This plan is different than many other business plans that are asset focused because the WPC and Targeted Reliability plans are focused on circuit performance.

The Underground Conversion Business Plan will programmatically convert a targeted subset of PSE's electric distribution feeder system to underground. The purpose of this plan is to improve system reliability by reducing exposure to hazards and to substantially improve the resiliency of the distribution system during major events, which is where the value of this more expensive solution is gained. While outages on feeder lines are less frequent than on radial lines, they are a significant contributor to overall company SAIDI, so decreasing feeder outages will have a measurable impact at the overall system level. This plan is different from the Targeted Reliability Business Plan because it proactively targets highest risk feeders exclusively for underground conversion. While past performance is taken into account, expected future performance and risk based on exposure and high customer counts are assessed to enhance predictive reliability, specifically targeting more heavily loaded high exposure feeders. In addition to improving reliability, converting overhead lines to underground removes many of the wildfire risks due to arcing that can occur due to tree damage and overhead equipment failure.

4.2.4. ASSET MANAGEMENT

PSE manages several grid modernization programs that have reliability as well as wildfire prevention benefits. The wildfire mitigation benefits are detailed in Table 2. Program descriptions are provided below.

Pole Program: This is a programmatic plan to address pole health, extend pole life, and address poor condition assets before they fail and result in an outage. The objective of this plan is to ensure that PSE's pole assets are reliable and resilient to the many external forces experienced. At the time of inspection, PSE will perform treatment that defends against insect damage, extending the life of a healthy pole for 10 years. If poles are found to be deficient, they are remediated through reinforcement and replacement. The pole program is on a 10-year cycle throughout the service territory.

Copper Replacement: The Resilience Enhancement-Copper Conductor Replacement Business Plan (Copper Conductor Replacement Business Plan) focuses on replacing aging smaller overhead copper (CU) conductors in PSE's primary distribution system. Copper conductor loses mechanical strength as it ages and has an increasing risk of failure. Investments will prioritize sections located in higher wildfire risk areas in addition to historically focusing on sections with the greatest degradation based on history of outages and/or splices on the conductor.

Distributed Energy Resources (DER) and Micro-grid Enablement: PSE has identified the need to address technical constraints of circuit design such that as the DER portfolio scales, the peak capacity output for DERs on a circuit will not be limited. PSE's system has not been designed to accept high amounts of reverse power flow, which may occur depending on the number of DERs on a circuit. PSE predicts that up to five percent of its circuits may have high DER penetration. Based on current data surrounding solar photovoltaic, there are high penetrations in Kittitas and Whatcom counties. Reverse power flow from DER production can result in voltage imbalances that impact reliability and power quality, which in turn limits available hosting capacity. With PSE's work to build transparency of where DERs can be hosted via hosting capacity analysis and maps, PSE expects circuits today with the greatest hosting capacity will attract higher numbers of DERs. PSE expects the specific circuits will be refined from interest through the DER Request for Proposal (RFP) process and PSE will review and improve those circuits as necessary with the intent of enabling DERs where they maximize benefits as identified in the DER RFP and to minimize or avoid DER curtailment. PSE will also incorporate equity and named communities into defining the specific investments that will be made. PSE's plan targets enabling 14 circuits in 2023, 17 additional circuits by 2024, and 24 additional circuits by 2025. As outlined in the MYRP, PSE will develop more defined circuit improvement scope and adjust the plan as necessary.

4.3. FAULT PROTECTION

Fault reduction strategies are intended to prevent normal operation of utility fault protection equipment from igniting dry grass or vegetation during fire weather events. Automatic reclosing schemes are essential for the fast restoration of service but can also result in arcing events in isolated cases.

As the utility industry adapts to a changing wildfire environment, manufacturers are also developing new equipment that is designed to operate in a manner that will not cause arcing or otherwise be a source of ignition for wildfires. Much of this technology is relatively new but may present opportunity for risk mitigation in specific applications.

Table 4: PSE's strategic approach to fault protection, benefits, and implementation considerations

APPROACH	APPLICATIONS AND BENEFITS	IMPLEMENTATION CONSIDERATIONS
Reclose Blocking	Preventing the automated reclosing function of protective devices after a fault lessens the risk of an ignition.	PSE's automated reclosing devices provide benefits to customer reliability by reclosing protective devices after a fault. In higher wildfire risk situations, PSE disables this reclose scheme to prevent the risks of inadvertently closing into a fault. To enable remote operations, these devices must be configured with SCADA control. The 2022 MYRP includes 44 SCADA projects in the wildfire risk circuits. Along with reliability benefits, the Distribution Automation (DA) program has the additional benefit of adding more SCADA control for key distribution devices. There are 10 DA projects proposed on higher wildfire risk circuits.
Arc suppression fuses	Arc suppression-style fuses significantly reduce the arcing and expulsion of hot metal in contact with ground vegetation, which can be experienced with standard fuse designs. The fuse has built in mechanisms that neutralize the arc, reducing the chance of ignition in the surrounding environment.	Fire-safe fuses are an emergent technology. They are not in wide-spread use and can have unintended impacts to the protection scheme of a circuit. To successfully add this equipment to PSE's system, we are installing a demonstration project on a higher wildfire risk circuit to verify constructability and efficacy.
Other System Re-Design Equipment	There are system redesign approaches that may provide benefits for wildfire mitigation: 1. Non-mineral oil transformers with higher ignition point. 2. Insulator bonding to prevent stray current heating metallic components. 3. Pole wraps can reduce the likelihood of pole failure during a fire. 4. Fiberglass cross arms are less likely to track electrical current to the pole.	PSE is developing construction standards for the higher wildfire risk areas incorporating new equipment such as FR3-filled service transformers, arc suppression fuses, and fiberglass cross-arms.

4.3.1. RECLOSE BLOCKING

Reclosers are a reliability tool installed to automatically open and close to restore outages that are momentary, which are the majority of PSE's faults. In higher wildfire risk situations, PSE disables reclosers to prevent the risks of inadvertently closing into a fault that could result in an ignition. By turning off reclosing on applicable protective devices, the circuit can be configured to operate in fire protection mode rather than reliability mode. Reclose blocking prevents the immediate restoration attempt and possible secondary fault. Before re-energization, line crews are dispatched to visually inspect the circuit. Only after a line is declared to be clear of any damage or fault sources will the circuit be re-energized.

PSE has implemented a process to turn off reclosing on higher wildfire risk circuits when high wind thresholds are exceeded along with a corresponding red flag warning. To increase the availability of this mitigation and to reduce outages as much as possible for customers, PSE has implemented projects to expand SCADA control to substation circuit breakers. The Substation SCADA program will bring SCADA capabilities to PSE's distribution circuits through equipment upgrades and improvements. SCADA implementation includes installation of controllers, relays, sensors, software, and information technology upgrades for telemetry and communication. These upgrades typically apply to the 12.5kV distribution system and enable data collection and communication between equipment to function automatically or controlled remotely if needed.

The Distribution Automation Business Plan drives deployment of smart technology to dramatically reduce the size and duration of outages that customers experience, having piloted this technology as far back as 2016. Specifically, Distribution Automation automates outage restoration on PSE's distribution system by identifying the faulted section of the electrical system, remotely operating switches to isolate the permanently faulted sections, and then automatically closing switches to restore power to the non-faulted sections. The DA system collects information from devices and determines the optimal switching to restore power to the largest number of customers in less than five minutes. The faulted section will remain without power until crews can repair the damage. Strategic deployment of the DA schemes will reduce customer minutes of interruption, SAIDI, by reducing the number of customers experiencing a sustained service interruption from any one outage event. Distribution reclosers deployed by this plan allow the distribution system to respond quickly and automatically and switch around an outage event.

The Recloser Business Plan will address the addition of new reclosers for reliability/sectionalizing purposes on a subset of PSE's feeder circuits company-wide and replacement of aging/obsolete (oil filled and Joslyn/SEL-351J) reclosers and sectionalizers. These specialized protective devices sectionalize and reduce the number of customers impacted by a permanent fault on the main line feeder. PSE has prioritized areas with the highest customer minutes of interruption (CMI) and is also evaluating adding wildfire risk reduction to the prioritization in addition to CMI. This plan's objectives are to increase situational awareness for PSE's operators and enable faster outage restoration by providing increased data points and automation. The installation of reclosers will also support the Distribution Automation Business Plan, but metrics for that plan are accounted for separately to prevent double counting of costs and benefits.

Transmission Automation is a method of automatic switching that uses sensors to detect transmission line faults. Once a fault is detected, a centralized controller performs automatic switching to isolate the faulted line section and restore the remaining sections. This method, called Transmission Line Automated Switching, improves on the existing automatic switching method that uses trial- and-error, rather than sensors, to determine the location of a transmission line fault.

4.3.2. ARC SUPPRESSION FUSES

PSE is evaluating new technology for fuses that suppress the arc that occurs when the fuse operates. The fuse uses an interrupting media (silver element and boric acid) and rod mechanism inside the fuse tube for arc extension, creating low arcing voltage and mild exhaust during fault interruption. The power fuse interrupting rating greatly exceeds that of conventional distribution cutouts that use a fuse tube and link design, and it considerably reduces the hazards and noise of the violent exhaust common to cutouts under fault interrupting conditions.

Under normal conditions, the fusible element's temperature is well below its melting temperature and does not melt. When a fault occurs that is large enough to melt the fuse element, an arc is initiated and elongated by the unit's spring, pulling the arcing rod up into the boric acid interrupting media. The heat produced decomposes the boric acid liner inside and produces water vapor and boric anhydride, which helps to de-ionize the arc. The by-products extinguish the arc at a natural current zero.

4.3.3. OTHER SYSTEM RE-DESIGNED EQUIPMENT

There is other system equipment that PSE has determined to be replaced in high-risk areas. For example, replacing mineral oil transformers with FR3-filled units can significantly reduce the chance of catastrophic failure and fire. FR3 has a flash and fire point of 330°C and 360°C respectively – more than twice that of mineral oil. FR3 is self-extinguishing and will not continuously burn if ignited. Another example is leakage current tracking along insulators can cause heating at the point where wood cross arms attach to wood poles and thus replacing the cross arm with fiberglass can block this leakage current and prevent pole-top fires. In a similar vein, bonding the base of transmission insulators to ground prevents leakage current from reaching the pole and safely shorts out flashover voltage.

5. OPERATIONAL PROCEDURES AND EMERGENCY RESPONSE

5.1. RESPONSE OPERATIONS AND COORDINATION

When a wildfire or WUI fire incident is anticipated or has entered an area in which PSE service equipment is located, PSE's Response Operations and Coordination protocols will commence.

PSE's Energy System Restoration Plan is the base plan document for gas and electric emergency response procedures, and it incorporates the use of recognized Incident Command System principles. The Energy System Restoration Plan standard plan elements apply to any emergency regardless of cause, in which emergency response activities are required. The wildfire/WUI document does not replace the Energy System Restoration Plan. It does provide unique actions necessary to monitor wildfire risks and respond to a wildland/WUI incident.

5.2. ROLES AND RESPONSIBILITIES

System Operations	Wildfire risk monitoring
	Operational readiness conference call
	Situational briefing call
	Electronic status updates (if ECC is not open)
Director, Electric Operations	Protection measure direction
	Activating PSE Ops Section presence near fire command
Load Office	Transmission strategy, as applicable
ECC Director	Activation of the ECC, if during the situation briefing activation is requested
Corporate Communications & PIO	Customer messaging as appropriate
	Situation report key messaging points, if ECC is activated
Business Services	Communication with major customers as appropriate
Government Relations	Communication with state officials as appropriate
Municipal Relations	Communication with officials from local jurisdictions as appropriate

Electric System Operations within PSE has the authority for operational response activities in response to wildfire incidents that pose a risk to PSE's electric infrastructure. Electric System Operations in consultation with the Director of Electric Operations shall activate the wildfire plan elements based on risk thresholds and available fire risk data.

PSE's response priorities in the event of a wildfire incident are as follows:

- Safety of PSE personnel and communities
- Stabilization of PSE infrastructure
- Preservation of property

When a wildfire has the potential to impact PSE infrastructure, Electric System Operations may elect to position a PSE Operations Section Chief and Deputy Chief near the fire service command post to maintain situational awareness and coordinate with fire service personnel, if needed.

If PSE infrastructure has been damaged as a result of a wildfire, restoration personnel may not perform assessment and restoration work until fire command or the agency in authority has deemed the area safe for entry. Once entry is possible, and the safety of PSE personnel has been cleared, standard assessment, repair and restoration activity may commence.

5.3. FIRE COMMAND INTERFACE

When a wildfire has the potential to impact PSE infrastructure, Electric System Operations may elect to position a PSE Operations Section Chief and Deputy Chief near the fire service command post to maintain situational awareness and coordinate with fire service personnel, if needed.

5.4. SITUATIONAL AWARENESS

Electric System Operations is responsible for monitoring weather related information on a daily basis throughout the year, including weather information related to wildfire risk. When a risk falls within prescribed action thresholds, Electric System Operations will share information as prescribed within this document, to ensure response readiness.

PSE uses the following sources to monitor wildfire activity:

- National Weather Service Seattle: https://www.weather.gov/sew/
- National Weather Service Spokane: https://www.weather.gov/otx/
- Northwest Interagency Coordination Center: https://gacc.nifc.gov/nwcc/
- PSE Wildfire Dashboard
- Washington State Department of Natural Resources Burn Risk Map: https://burnportal.dnr.wa.gov/
- Washington State Incident Information Map: https://inciweb.nwcg.gov/?state=49

5.5. ACTIVATION THRESHOLDS

The following fire weather conditions warrant the activation of this Plan when a wildfire risk is within a PSE service area or threatens encroachment within a PSE service area. This includes evaluating the specific conditions to determine appropriate action.

- **Fire Weather Watch:** Issued to alert fire officials and firefighters of potentially dangerous fire weather conditions within the next 24 to 36 hours. A Fire Weather Watch will turn into a Red Flag Warning 12-24 hours before the forecasted fire weather conditions are expected to occur.
- **Red Flag Warning:** Issued to alert fire officials and firefighters of potentially dangerous fire weather conditions within the next 12 to 24 hours.
- **Fire Weather Watch or Red Flag Warning with forecasted wind gusts in excess of 50 MPH:** High winds in combination with low humidity and dry fuels increase the threat of wildfires.

Following the notification to the Director, Electric System Operations will coordinate an operational readiness conference call to determine appropriate actions and will include leadership decision making representation.

5.6. EXTERNAL COORDINATION

PSE's Business Continuity and Emergency Management department has long-standing, established relationships with emergency management agencies throughout our system, including agencies at the city, county, and state level. These relationships extend to fire departments and regional authorities as well.

During an emergency event, PSE communicates with these agencies through situation reports. Agencies have been provided emergency phone numbers as well as the PSE Emergency Coordination Center phone number. Additionally, PSE's Government Relations, Municipal Relations and Business Services organizations respond to questions as needed.

Prior to an emergency event, PSE participates in various emergency planning and coordination meetings, including seasonal readiness meetings, serving on county and state emergency committees, participating in exercises, after-action debriefs and improvement planning meetings. PSE's Business Continuity and Emergency Management Department also participates in industry emergency response and mutual aid committees through the Edison Electric Institute (EEI) and the Western Electric Institute (WEI). PSE is also a member of the Western Region Mutual Assistance Group (WRMAG).

PSE is planning to participate in County Emergency Management Summer Hazards Workshops on the following dates in 2022:

Pierce County – May 11

King County – May 19

Whatcom County – May 24

Thurston County – June 9

Skagit County – TBD

Kittitas County – TBD

The summer hazards workshops are sponsored by the County Emergency Management Agency and focus on extreme heat events, including summer long-range weather forecasts predictions, extreme heat preparedness events, high smoke events, and wildfire/WUI events. Presenters include PSE, the NWS, DNR, and County Emergency Management Agencies. Additional presenters may be included depending on County Emergency Management Agency preferences. The audience includes first responders, County and Local emergency management, 911 centers, public health, the Department of Transportation, and school districts.

PSE also participates in the Washington State Department of Natural Resources Electric Utilities Wildland Fire Prevention Task Force.

5.7. RECOVERY

If PSE infrastructure has been damaged as a result of a wildfire, restoration personnel may not perform assessment and restoration work until fire command or the agency in authority has deemed the area safe for entry. Once entry is possible, and the safety of PSE personnel has been cleared, standard assessment, repair and restoration activity may commence.

5.8. RESOURCES AND CONTACTS

- National Weather Service
- Northwest Interagency Coordination Center: https://gacc.nifc.gov/nwcc/
- Washington State Department of Natural Resources Burn Risk Map: https://burnportal.dnr.wa.gov/
- Washington State Incident Information Map: https://inciweb.nwcg.gov/?state=49
- PSE Wildfire Dashboard

5.9. WA DNR DISPATCH CENTERS

- Pacific Cascade Region, Castle Rock, WA 360-575-5089
- South Puget Sound Region, Enumclaw, WA 360-802-7031
- Northwest Region, Sedro Woolley, WA 360-854-2878
- Olympic Region, Forks, WA 360-374-2800
- Central Washington Interagency Dispatch Center, 509-884-3473
- Northeast Washington Interagency Dispatch Center, 509-685-6900
- DNR Coordination Center, Olympia, WA 360-902-1300. DNR Webpage: https://dnr.wa.gov

6. COMMUNICATION AND OUTREACH

In the event of a wildfire related electric or natural gas disruption, PSE will work to provide customers and the community, as well state, county and local agencies and other key stakeholders, with accurate and timely information. Communication will take place through channels and platforms commonly used in storms and other emergencies to leverage best practices and existing customer knowledge and preferences for how to access information from the utility. The objective will be to provide, if known, the cause of the service disruption, the nature of the disruption, such as whether the disruption is due to system damage or is precautionary, and an estimated time of service restoration. The goal will be to enable customers to take necessary preparedness actions and to minimize the inconvenience and hazards of a loss of energy service.

- Key communication strategies to customers during wildfire related disruptions will use a variety of traditional and digital media, depending upon the nature of the disruption, to provide updates and information through the following:
  - Local news media, including broadcast, digital and print;
  - Social media, using PSE's existing social media platforms as well as those of news outlets and community partners;
  - Digital advertising channels;
- Direct customer communications, which may involve the use of multiple PSE service channels, including:
  - Telephonic service available through PSE's customer representatives and interactive voice response (IVR) platform
  - Updates and information on PSE.com and the MyPSE mobile app
  - Deployment of community engagement team members

PSE will leverage its relationships with stakeholders and community partners, including state, county and local government agencies and officials, as well as non-profit, service, and community-based organizations, to ensure they have current and correct information and enable amplification and distribution of timely information across as wide an audience as possible. In disseminating any news or information, it will be a priority for PSE to notify all possible customers within an impacted area. Partnership and coordination with community leaders and trusted voices will extend the reach of vital information to the greatest number of residents and customers.

As PSE develops a PSPS plan, communication strategies will be a core component of the process. Systems, tools, processes, and materials that PSE does not currently have as part of our communications toolkit will need to be developed and additional staff resources allocated to PSPS communications. These might include automated systems for proactive notifications based on customer preferences, trans created materials in multiple languages, interactive online tools, and specialized notifications and outreach to customers with medical needs. This is in addition to pre-season customer information and education about PSPS that could include customer meetings, customer mailers, website materials and video content, and partnerships with community-based organizations. Best practices from other utilities will be utilized in addition to strategies to prioritize communication with vulnerable and hard-to-reach customers.

Prior to any specific wildfire threat, PSE is focused on communication with customers about preparedness. This communication has two goals: raising customer awareness about PSE wildfire preparedness and second, educating customers about how they can help prevent wildfires through information from the Department of Natural Resources. Communication activities will include general awareness as well as targeted communication, such as:

- PSE.com landing page featuring our Plan and materials from the Department of Natural Resources
- Social media (organic and paid), email, earned media and printed bill inserts (for advance, seasonally relevant information only)
- Outreach to community organizations, agencies and jurisdictions (including partners that serve vulnerable and hard to-reach populations)

We will also be holding our initial community engagement meeting in June with customers on two of our highest risk circuits in Kittitas County. This meeting will provide education to customers about PSE's specific wildfire risk identification and reduction efforts in Kittitas County. Additionally, through a facilitated conversation, we will gather feedback from customers and community members on potential future wildfire risk mitigation measures, including PSPS. This town hall is being designed so it can be replicated in other higher risk areas of our service territory, incorporating lessons learned from the initial meeting. We will also be using a variety of outreach methods for inviting customers to the town hall, from direct customer mailers and email invitations to coordination with community-based organizations, local and state officials, and media to ensure the broadest possible and most inclusive outreach.

7. CONCLUSION

Energy is an essential service, and safety is PSE's top priority. PSE is proud to have served customers and communities across Washington State for nearly 150 years, and we are committed to the continued delivery of energy that is clean, safe, reliable, affordable and equitable. This Plan reflects those priorities in its comprehensive approach to wildfire mitigation and response.

We also recognize wildfires are an evolving risk. This Plan documents our strategies, programs, procedures, and actions for effective wildfire preparedness, mitigation, and response. We will also continue to implement other grid modernization and reliability, resilience, and safety strategies that provide additional reliability and wildfire benefits with minimal impact on energy delivery to our customers. However, as we consider and develop future actions and tools, such as a PSPS plan and related procedures, that may have direct and significant impacts on service to customers, we must engage a broad range of stakeholders and communities to collectively evaluate effective Plan implementation. We look forward to ongoing discussions with the Utilities and Transportation Commission as well as with our customers and public sector and community partners about this important topic.

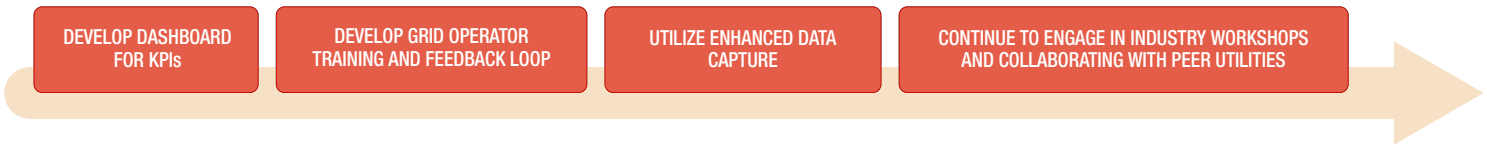
This Plan represents a comprehensive portfolio of risk management, operations, emergency management, communications, training and continuous improvement programs and procedures, with the ultimate priority being the safety of our personnel, our customers, and the communities we serve. However, we are committed to managing our Plan adaptively as new technologies may emerge and opportunities arise to test the Plan's strategies, programs, and procedures. In the interest of wildfire mitigation being vast in nature, our Plan must align with the evolving efforts of other agencies and needs of the customers and communities we serve. PSE is committed to continuing to enhance our whole community approach in improving our Plan by collectively engaging a broad range of stakeholders and evaluating the risks to adaptively manage implementation of this Plan.

APPENDIX A-1: EXECUTION AND CONTINUOUS IMPROVEMENT

Definition and Objective
Effective plan execution requires staff focused on identifying and incorporating best practices to ensure PSE's plan effectively and adaptively addresses evolving wildfire risks within PSE's territory.

Plan years	On-going
Total Cost	Unknown at this time
Wildfire Risk	H, M, and L
Key Performance Metrics	Number of ignition events Number of arcing events Acres burned Industry practices deployed Number of RCAs performed

Plan Next Milestones		
Key Strategy	**Process**	**Key Accomplishments 2021-2022**
Engineering	Wildfire and Vegetation Engineer	New Engineer focused on: • Holistic strategies and processes for reducing wildfire risk and improving reliability and resiliency. • Developing and implementing asset management strategies for long-term system hardening in higher wildfire risk areas. • Engaging with the industry and vendors to align with best practices and evaluate the potential for integrating new technologies or approaches to reduce wildfire risk. • Working with standards to improve equipment specification and exploring new technologies.
Analysis	Data Scientist	Position to be hired in 2022
	Data Capture Capability	In 2022, develop and implement improved methods for capturing and logging fire ignition data
Program Management	Wildfire Program Manager	Starting April 18, 2022 This position is responsible for leading PSE's ongoing development and implementation of our corporate wildfire risk reduction strategies and assembling and leading multi-disciplinary teams to ensure mitigation implementation aligns with overall corporate objectives
Lessons Learned	Root Cause Analysis (RCA)	In 2022, evaluate use of existing reliability RCA processes for application in wildfire risk reduction
	2021 experience	Continued to develop risk model, including burn potential and fire propagation, likelihood, and consequence of ignitions; continued engagement with DNR advisory committee
	Industry sharing	Wildfire Season Recap Summit January 2022 WEI Wildfire Planning and Mitigation Conference April 2022 Ongoing meetings and discussions with peer utilities Avista bi-annual meetings focused on risk prevention Training and continuous improvement with transmission and distribution grid operators



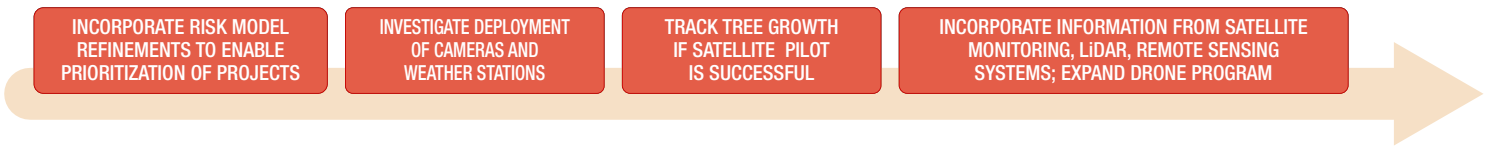
APPENDIX A-2: SITUATIONAL AWARENESS

Definition and Objective
Real-time situational awareness is enhanced through operator dashboards utilizing public risk and weather datasets. Real-time operations personnel can use these dashboards to trigger operational decisions such as non-reclose operation of distribution circuits, staging first-response personnel, and required visual inspection during restoration efforts. These actions will significantly reduce the risk of ignition.

Plan years	2020-2025
Total Cost	$13 million
Wildfire Risk	H, M, and L
Key Performance Metrics	Dashboard uptime Number of dashboard improvements Number of pre-season inspections performed on time Number of agency coordination events Miles of WUI (increasing over time)

Plan Next Milestones

Key Strategy	Process	Key Accomplishments 2021-2022
Assess Risk	Risk Modeling	New Engineer focused on: • Holistic strategies and processes for reducing wildfire risk and improving reliability and resiliency. • Developing and implementing asset management strategies for long-term system hardening in higher wildfire risk areas. • Engaging with the industry and vendors to align with best practices and evaluate the potential for integrating new technologies or approaches to reduce wildfire risk. • Working with standards to improve equipment specification and exploring new technologies. Position hired in 2022
	Annual risk rating	In 2022, develop and implement improved methods for capturing and logging fire ignition data
Fire Weather Monitoring and Risk Mitigation	Daily Dashboard	Updated real-time dashboard with new risk classifications and additional real-time environmental data to monitor fire weather conditions.
	Ignitions and fire tracking	Enhanced data capture procedures to enable more granular tracking and ongoing trend analysis of ignition and wildfire events in logs as compared to other fire events; developing new tracking tool for field recording.
Inspection Technology	Aerial and thermal inspection devices	Initiated pilot for satellite imagery that will feed predictive modeling
Pre-Wildfire Season Inspections	Ground and helicopter inspections	Piloted OSMOSE overhead detailed inspection. Inspected and addressed tree and equipment issues on 4 transmission circuits and 19 distribution circuits.



APPENDIX A-3: FAULT REDUCTION

Definition and Objective
Reduce wildfire risk by preventing the interaction of utility infrastructure and the environment through incorporating a variety of fault reduction strategies tailored to the wildfire environment.

Plan years	2020-2025
Total Cost	Capital - $ 100.8 million for known projects – additional dollars will be allocated as additional projects are scoped O&M - $ 17.7 million for pole replacement and pre-wildfire season vegetation management
Wildfire Risk	H, M, and L
Key Performance Metrics	Distribution grid hardening projects completed Miles of bare conductor upgraded Miles of conductor undergrounded Miles of covered conductor installed Number of poles replaced Number of PSPS deployed

Plan Next Milestones		
Key Strategy	**Process**	**Key Accomplishments 2021-2022**
Vegetation Management	Pre-wildfire season trimming	2021 trimmed 1,692 trees 2022 to be addressed with completed inspections
	Pre-wildfire season hazard Tree Removal	2021 removed 473 trees 2022 to be addressed with completed inspections
Public Safety Power Shutoffs	Operational planning	Defined circuit characteristics for impact including evaluating community and customer impacts to decide priority areas. Focusing on 2 circuits for initial planning
	Community Engagement and customer education	June 2022 first community and customer education meeting in Cle Elum Additional community and customer education meetings being planned
Deploy Covered Conductor and Strategic Undergrounding	Defined investments	2021 completed 1 installations of covered conductor 2021 completed 2 undergrounding projects 2022 planned 2 covered conductor projects 2022 planned 1 undergrounding project
Asset Management	Defined investments	2021 replaced poles at the end of their useful life on 11 circuits 2022 planned replacement of poles at the end of their useful life on 9 circuits. 2022 DER projects are being planned

2023: 15 PROJECTS BEING EVALUATED

2024: 27 PROJECTS PLANNED

2025: 17 PROJECTS PLANNED

APPENDIX A-4: FAULT PROTECTION

Definition and Objective
Reducing the duration and extent of faults or the likelihood of an ignition. Several common fault protection tactics include altering automatic reclosing and protective device settings.

Plan years	2020-2025
Total Cost	Capital - $ 33.6 million for known projects – additional dollars will be allocated as additional projects are scoped
Wildfire Risk	H, M, and L
Key Performance Metrics	Number of reclosers SCADA upgrades to circuit breakers Distribution Automation schemes installed Overhead equipment failure tracking Number of fiberglass arms installed Arc-suppression fuses installed FR3 transformers installed

Plan Next Milestones		
Key Strategy	**Process**	**Key Accomplishments 2021-2022**
Reclose Blocking	SCADA enablement	2021 4 projects completed 2022 7 projects planned
	DA and TA	2021 2 Transmission Automation Projects completed 2022 2 Transmission Automation Projects planned
Arc Suppression fuses	New technology	New arc suppression fuse in trial
Other System Re-Design Equipment	FR3 filled transformers	2021 1 demonstration project completed 2022 Piloting arc suppression fuses and FR3 transformers
	Fiberglass cross arms	2022 – Piloting fiberglass cross arms
	Reclosers	2021 – 5 Recloser installation projects completed 2022 – 7 Recloser installation projects planned
	Bonding transmission insulators	Developing standards in 2022

2023: 52 PROJECTS PLANNED

2024: 18 PROJECTS PLANNED

2025: 16 PROJECTS PLANNED

APPENDIX A-5:
OPERATIONAL PROCEDURES AND EMERGENCY RESPONSE

Definition and Objective
PSE's operating procedures in higher wildfire risk areas and during wildland fire weather events require proactively monitoring our system and maintaining situational awareness as well as closely coordinating our emergency response activities with many other entities.

Plan years	2020-2023
Total Cost	TBD
Wildfire Risk	H, M, and L
Key Performance Metrics	Number of overhead equipment failures Number of system operations actions taken from dashboard use Number of PSPS deployed

Plan Next Milestones		
Key Strategy	**Process**	**Key Accomplishments 2021-2022**
Emergency Management	Workshops	Attending Six county summer hazard workshops planned in 2022
	Wildland Fire Prevention Task Force	Attended meetings and participated in discussions with DNR
Operational Procedures	Situational Awareness	Updated operating procedures to reflect 2022 risk modeling Enhanced ignition event data capture and logging capabilities in 2022 Performed online training for operations leadership
	Activation thresholds	Established thresholds and protocols to guide evaluation of operational actions Proactively responded to 10 red flag warnings; modified procedures with field feedback; Kittitas real time coordination established
	Fire Command Interface	Proactively responded to 10 red flag warnings; modified procedures with field feedback; Kittitas real time coordination established 2021 collaborated with fire districts throughout Pierce County and with Tacoma Power to mutually understand operation and emergency communications procedures Established real-time communication with Kittitas fire during emergency events 2022 Expanding this effort to additional fire districts including the six emergency management workshops mentioned above Updated internal Safety Procedures

EXPAND ON COLLABORATION WITH DNR, FIRE DISTRICTS, AND OTHER UTILITIES IN THE AREA

ANALYZE DATA CAPTURED THROUGH SOFTWARE UPDATES FOR DAILY LOGGING

DETERMINE ADJUSTMENTS TO OPERATIONAL PROCEDURES BASED ON DATA ANALYSIS

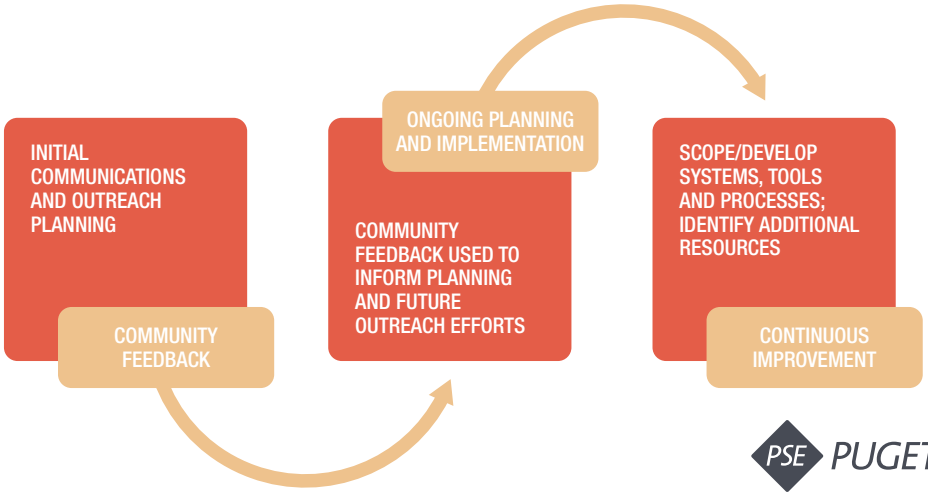
APPENDIX A-6: COMMUNICATIONS AND OUTREACH

Definition and Objective
Effective external and internal communication is essential for coordinated prevention and response to wildfire risks. PSE will host several community engagement sessions in higher wildfire risk areas to inform and develop unique community- and customer-centric actions and wildfire mitigation tools, such as an effective PSPS plan. In addition, PSE works with land management groups ahead of fire season and fire response personnel during wildfire events. Customer communication follows established protocols from storms and other emergencies.

Plan years	2020-2022
Total Cost	Estimated budget per town hall event: $45,000-100,000 Note: Budget for additional communication tools and resources that may need to be developed is unknown at this time.
Wildfire Risk	H, M, and L
Key Performance Metrics	• Customer participation/feedback from community meeting(s) • Customer communication via multiple channels (social media, bill inserts, etc.) • Number of meetings with fire agencies • Number of meetings with forest land agencies

Plan Next Milestones

Key Strategy	Process	Key Accomplishments 2021-2022
Communication tools and channels	Planning	• Developing a communications plan to gather public input from customers in higher risk wildfire areas, including a series of facilitated town hall meetings. The plan includes leveraging existing relationships within the community to ensure a thoughtful approach to inviting community members to the table • Developing communications materials, including maps, fact sheet, web content and slide deck to educate the public, customers and key stakeholders • Created wildfire.response@pse.com email inbox as a tool for communicating with customers and the public • Working to onboard an external facilitator to help collect feedback during town hall meetings, capture and summarize feedback to inform future town halls and wildfire planning efforts • Providing communications perspective, recommendations and tools/resources needed for public education and customer notification around potential future PSPS events • Identifying key media publications or community newsletters to target for proactive outreach ahead of fire season
Pre-Season	Communication activities	• Launched web landing page (pse.com/wildfireplan) with customer information about how PSE prepares and what they can do to prepare as well as communicating with customers through social media, bill inserts, community partnerships • Proactive outreach to media publications or community newsletters ahead of fire season, ahead of wildfire-related community engagement events, or to share program developments or milestones • Business Continuity team is connecting with County emergency management agencies to discuss wildfire and summer weather safety
During an event	Communications activities	• Use of existing storm/emergency channels to share information. Available channels include social media, web, media engagement, email/phone calls to customers, jurisdiction and key stakeholder engagement



APPENDIX B: INVESTMENTS BY BUSINESS PLAN WITH WILDFIRE RISK REDUCTION BENEFITS

PSE's investments in grid modernization programs that also have benefits to risk reduction for wildfire areas. These dollars are based on the estimates of the proportion of the planned investments for those programs that will provide wildfire risk reduction benefits. This estimate reflects only the assumed amount of investment that will occur in higher wildfire risk areas as well as the wildfire risk impact.

Business Plan	Wildfire Risk Impact			$ Investment (Millions)	Relevant Investments
	High	Medium	Low		
Resilience Enhancement - Copper Conductor Replacement	X			1.3	Replace aging #6 and smaller copper conductor. This conductor is losing mechanical strength as it ages and has an increasing risk of failure. Prioritize the 4.2 miles in higher wildfire risk area.
Distribution Automation (DA)		X		33.3	Prevent reclosing into faults by using grid sensors to locate faults and remotely operate switches to isolate faulted sections.
Circuit Enablement - DERs and Microgrids			X	11.9	Remove constraints from the electric system to allow for Distributed Energy Resources and Microgrids to lessen impact of wildfire outages.
Circuit Enablement - EV			X	1.3	Prevent overloading the circuit due to increasing Electric vehicle utilization.
Poles Inspection and Remediation	X			20.8	Identify, repair, and replace failing poles and inspect pole-mounted equipment.
Underground Conversions	X			3.2	Directly remove exposure and ignition source.
Reclosers			X	5.6	Installing new 3-phase reclosers through the system to improve reliability and allow for additional sectionalizing. Also replacing aging/obsolete reclosers.
Resilience Enhancement - Expanded			X	0.2	Drone inspection to identify failing equipment, radial feeder microgrid enablement to lessen impact.
Targeted Reliability		X		12.6	Capacity upgrades, tree-wire, Underground Conversion, reliability improvements.
Targeted Reliability - Root Cause Analysis			X	0.1	Framework for tracking and learning from equipment failures.
Substation SCADA			X	2.3	SCADA control for sectionalizing and DA enablement.
Transmission Automation		X		6.1	Prevent reclosing into faults on the transmission system.
Worst Performing Circuits	X			18.3	6 priority wildfire circuits, and 14 other wildfire circuits are WPC, direct reliability improvements.
Wildfire Mitigation	X			13.0	Fuse, Transformer, crossarms replacement, fast tripping, rebuilds.

APPENDIX C:
CHRONOLOGY OF THE PSE WILDFIRE PROGRAM (2018-2022)[1]

PSE's investments in grid modernization programs that also have benefits to risk reduction for wildfire areas. These dollars are based on the estimates of the proportion of the planned investments for those programs that will provide wildfire risk reduction benefits. This estimate reflects only the assumed amount of investment that will occur in higher wildfire risk areas as well as the wildfire risk impact.

Year	Event / Action
11/2018	Camp Fire: Deadliest and Most Destructive Wildfire in California History
01/2019	Board of Directors Presentation Natural Disaster and Electric System Risk. Informational update on PSE's electric system with emphasis on insights from California Wildfire events.
Q2 2019	PSE investigates Integrated asset management software solution. This is a framework for other asset analytics such as wildfire. Reviewing vendors, initial implementation 2023
03/2019	Wildfire Risk Assessment - Assessment of Internal Department Tactics to Mitigate Fire Risk meeting with "enterprise risk management"
06/2019	ESRI OH Wire Fire Risk Assessment USFS Wild Fire Hazard created
07/2019	Substitute Senate Bill 5305 created the Task Force and became effective July 28, 2019.
07/2019	Additional helicopter flyover inspection of cross-mountain transmission lines #1. Transmission Maintenance and Inspection Plan requires helicopter flyover of IP transmission line, but this is in addition to that requirement
07/2019	Training for Operations/EFR
07/2019	Additional 3rd Serviceman in Kittitas
07/2019	4 additional reclosers with SCADA control in Kittitas installed
07/2019	Fire hazard area pole inspections
07/2019	Fire hazard area vegetation inspections
08/2019	ESRI OH Wire Fire Risk Assessment DNR WUI Risk Map created. In 2019, PSE mapping overlaid the overhead electrical system with the Wildland Urban Interface High Risk Communities map available from the Washington DNR. The mileage in "High Risk" areas and a double-weighted mileage of "Extreme Risk" area exposure was used to give relative Risk Exposure among all circuits. The 19 distribution circuits and 5 Transmission circuits comprising the top ~50% of risk were prioritized for 2020 fire mitigation.
08/2019	Prioritize circuits for risk
09/2019	Additional helicopter flyover inspection #2
11/2019	PSE XSGL Insurance Renewal included wildfire program review
11/2019	Pacific Northwest Utility Wildfire Working Group hosted by Avista. PSE and other utilities in attendance
11/2019	2nd Wildfire Task Force meeting Lead by Dept of Natural Resources
12/2019	Explore high-speed clearing (broken wire) technology.

1 This chronology may not be fully exhaustive in capturing all efforts relative to PSE's wildfire

Year	Event / Action
Q1 2020	Asset Management identified the priority wildfire risk circuits for 2020 planning. All of those high-risk distribution circuits have been inspected by vegetation crews, identifying sites for vegetation trimming to be complete by July 1.Recent efforts include an enhanced root cause analysis of larger outages led by Electric System Planning and efforts to improve the failure forensics analysis for line equipment led by Electric Standards. Efforts are now being made to specifically track fire-related events where sparking, flame, and live wire down events occur. In order to improve situational awareness for system operators and to improve the circuit risk scoring, additional risk mapping and real-time situational data is being compiled on top of PSE's circuit maps. A wildfire dashboard is being created for use by system operations in guiding operation decisions. The 2020 wildfire season will be a test bed for this real-time situational awareness tool. Building off the 2019 season and using best practices identified in conjunction with numerous other entities, notably the Western Energy Institute, PSE continues to develop tools and processes to understand, reduce, and react to wildfire risks
Q1 2020	Operational Process Tree – Communication and decision tree for making system changes based on situational data.
Q2 2020	Internal and cross-agency communication and coordination
02/2020	3rd Washington State Department of Natural Resources (DNR) Taskforce Meeting
Q2 2020	Process improvement for operational decisions and communication around wildfire risks PRE PSPS discussions. Gearing up towards a PSPS or any operational decisions, reclose blocking. Standard operating procedure for system operators' response to wildfire risk.
03/2020	High Risk Circuit Analysis completed.
03/2020	PSE Change Management Document for wild fire mitigation and operation decisions created
03/2020	Kickoff to create distribution design standards for wildfire risk areas.
04/2020	Internal Wildfire Mitigation Plan V1 created
05/2020	Propose ESRI Wildfire Situational Awareness Map for Daily and Annual
05/2020	Top 50% (~ 20 Distribution Circuits) High-risk circuit's equipment inspections and vegetation management completed by Wildfire season
06/2020	Aerial inspection helicopter flyover of cross-mountain transmission lines (additional to FAC-008 compliance inspection)
06/2020	Wildfire Pre-season Report written
07/2020	Wildfire Internal Safety Message developed
07/2020	PSE Daily and Annual Wildfire Risk dashboards created with real-time weather and red-flag warnings; testing begins
08/2020	Consistent Safety Message for August: Wildfire Prevention distributed internally
10/2020	PSE Daily and Annual Wildfire Risk dashboards released to production
12/2020	Avista wildfire meeting
01/2021	King County Emergency Management Engagement
Q2 2021	Explore HIF relay technology, firmware necessary for SEL being tested in lab
Q2 2021	Helicopter IR scan of Cascade White River Transmission Line
04/2021	Wildfire dashboard training rolled out thru PALMS and incorporating operator feedback
04/2021	Wildfire Prevention and Response Plan updated
04/2021	Response plan shared with WUTC
05/2021	Top 50% (~ 20 Distribution Circuits) High-risk circuit's equipment inspections and vegetation management completed by Wildfire season

Year	Event / Action
05/2021	CLE-11: FR3 transformers and non-expulsion fuses pilot project. Demonstration to develop alternative system design standards and materials for high-risk areas.
05/2021	Pole Wrap installed at 4 locations in Kittitas, 6 poles at each location.
05/2021	Pilot trial of Osmose overhead detail inspection ODI conducted as part of last summer's pole inspection for Pole Program
05/2021	PSE Yellow Book and Work Practice Safety Updates
06/2021	Aerial inspection helicopter flyover of cross-mountain transmission lines (additional to FAC-008 compliance inspection)
09/2021	Revise PSE talking points around wildfires. Post Wildfire season review/lesson learned
10/2021	Explore Satellite/etc inspection and situational awareness work with AiDASH ongoing
11/2021	UTC wildfire open meeting presentation
12/2021	Wildfire Asset Engineer hired
Q1 2022	WA State bill 5803 January 2022 proposed
Q1 2022	Engineering Complete for 2022 System Hardening Proof of Concept Equipment Trial , including fiberglass arms on CAS-16
02/2022	Develop tracking and RCA for system-caused ignitions- ongoing now
02/2022	Wildfire Circuit Priority List for 2022 created and distributed internally
03/2022	PSE Wildfire Region Binary Map created
04/2022	Wildfire Program Manager hired
04/2022	Wildfire Mitigation and Response Plan updated
05/2022	Pierce County Emergency Management Summer Hazards Workshops; King County; Whatcom County
06/2022	Kittitas Community Outreach Event
06/2022	Thurston County Emergency Management Summer Hazards Workshops

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