



**ANAHEIM**  
PUBLIC UTILITIES

# Wildfire Mitigation Plan 2020



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## SECTION 1- Introduction

### A. Introduction

The Anaheim Public Utilities Department (APU) began providing electric utility services to the City of Anaheim (Anaheim) in 1895. Anaheim's population has grown to approximately 360,000 and there are 20,000 businesses located in the city. Anaheim is the 10<sup>th</sup> largest city in California, with the only municipally-owned electric and water utility in Orange County. APU is governed by the Anaheim City Council who appoints a Public Utilities Board that serves as an advisory body consisting of local residents to provide recommendations and reviews APU's operations, finances, and conducts public hearings.

Anaheim is about 50 square miles and divided into six Council Districts (see Figure 1). For the purpose of this Wildfire Mitigation Plan (WMP), the areas considered to be in the Fire Threat Zone (FTZ) are generally in District 6, or the eastern portion of Anaheim.

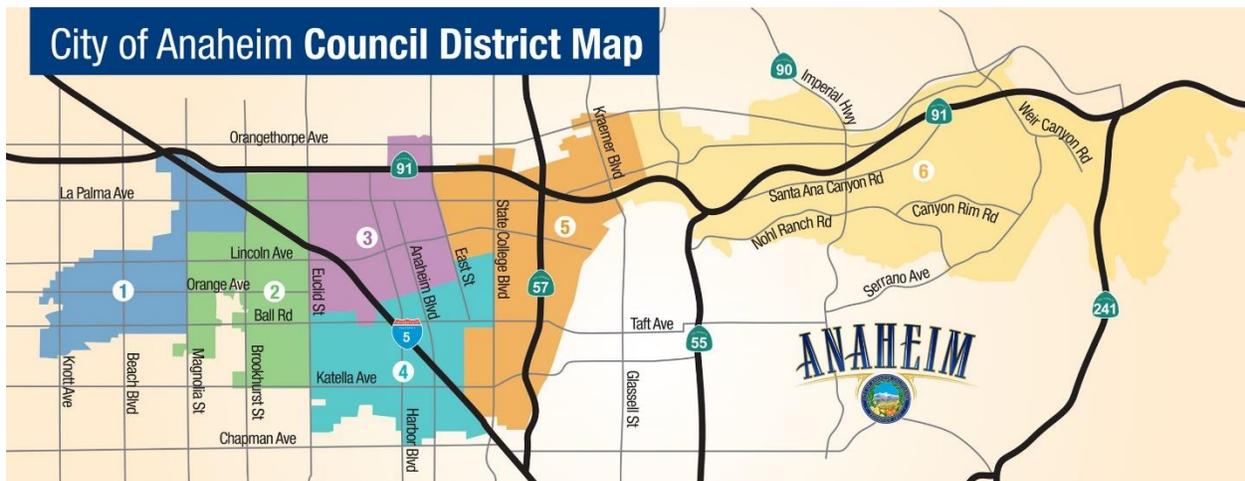


Figure 1. Anaheim City and Council District Boundaries

APU generates electricity from an in-basin natural gas powered plant and is a partial stakeholder in various regional power generation facilities with transmission entitlement and therefore is a Participating Transmission Owner (PTO) with the California Independent System Operator (CAISO). APU does not directly maintain transmission assets and is registered as a Distribution Provider/Resource Planner with the North American Electric Reliability Council (NERC) and Western Electric Coordinating Council (WECC), agencies responsible for electric reliability and compliance oversight. APU is interconnected to the regional grid at 220 kilovolts (kV) and distributes power from its fourteen 69 kV to 12 kV substations located throughout Anaheim through approximately 1,200 circuit miles of sub-transmission and distribution lines. APU's historic peak demand is 596 Megawatts (MW). In 1990, the Anaheim City Council authorized an Underground Conversion Program to underground overhead lines along major thoroughfares, and in 2016 amended the program to expand the types of eligible projects that include reliability improvements such as wildfire safety. To date, 133 circuit miles have been undergrounded as a result of this program. APU also features the first fully underground substation in the United States that is located in District 6 that provides reliability, aesthetic, and operational benefits to

the community. APU is also a full service water utility and has its Walnut Canyon Reservoir, a 920 million gallon facility, in the eastern part of Anaheim that has been used extensively by water carrying aircraft during regional fires.



Figure 2 (a) Park Substation (b) Walnut Canyon Reservoir during Canyon Fire 2

Wildfire safety is a critical issue in Anaheim. As recently as 2017, a wind-driven wildfire (Canyon Fire 2) destroyed homes and caused the evacuation of thousands of residents in Anaheim. The cause of Canyon Fire 2 was due to embers from a previous wildfire, and no APU sub-transmission or distribution lines were impacted as approximately 98% of APU-owned power lines in the FTZ are currently underground, which significantly reduces the overall risk to the community. As a customer-owned utility, APU emphasizes safety, reliability and affordability in its daily operations and long-term investments.

## B. Overview and Objectives

This WMP serves to establish methods and procedures used to construct, maintain, and operate APU's electrical lines and equipment to minimize the risk of wildfire posed by its infrastructure. The provisions set forth below outline the preventative strategies and actions for fire prevention and suppression activities and specific operational response during elevated fire and weather conditions to limit potential electric sources of fire ignition in the FTZ within APU's service territory.

The WMP is intended to meet the provisions mandated in Senate Bill 1028 (Hill), which became law in 2016 and requires all public and private utilities and corporations to assess whether portions of the geographical area where the utility's overhead electrical lines and equipment are located has a significant risk of a catastrophic wildfire resulting from those electrical lines and equipment, and if so, present mitigation measures the utility intends to undertake to minimize that risk. In 2018, SB 901 (Dodd) was adopted which outlined the elements to be included when assessing the risks and formulating a WMP. As further required by AB 1054 (Holden) enacted in 2019, a WMP must be submitted to the California Wildfire Safety Advisory Board (CWSAB) for review by July 1, 2020 and, in the case of publically owned utilities (POUs), for an advisory opinion. At least once every three years thereafter, the CWSAB submittal must present comprehensive revisions, as needed, of the utility's WMP. The WMP elements include:

- 1) Objectives of the WMP;
- 2) A Fire Threat Assessment including location and weather condition warnings;
- 3) Identification of utility assets located in Tier 3 FTZ and immediately adjacent thereto;
- 4) A description of the preventative strategies and programs to be adopted to minimize the risk of APU electrical lines and equipment causing catastrophic wildfires including vegetation management, system inspection, and construction standards;
- 5) A description of the factors used to determine when it may be necessary to de-energize electrical lines and deactivate its reclosers;
- 6) A description of the metrics used to evaluate WMP performance and discussion of how to use performance metrics to enhance ongoing plans;
- 7) An accounting of the responsibilities of persons responsible for executing the WMP;
- 8) Monitoring and audit provisions that support implementation of the WMP, and identifying any deficiencies or areas for improvement; and
- 9) Ongoing monitoring and audit of the effectiveness of electrical line and equipment inspections.

Additionally, this WMP includes a summary of emergency shut-off procedures to de-energize power lines if they are at risk of coming into contact with each other and creating a spark due to high winds or other events. Table 1 is a summary of the elements required within a SB 901 plan as compared to the elements included in this WMP.

Table 1. Elements Consistent with SB 901-Public Utilities Code Section 8387(b)

SB 901 Requirements	Description	Section Number
b (2) (A)	An accounting of the responsibilities of persons responsible for executing the WMP	10(D),11,13
b (2) (B)	The objectives of the WMP	1
b (2)(C)	A description of the preventive strategies and programs to be adopted by the POU to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks.	3, 7, 8, 9, 10
b (2)(D)	A description of the metrics the POU plans to use to evaluate the plan’s performance and the assumptions that underlie the use of those metrics	14
b (2)(E).	A discussion of how the application of previously identified metrics to previous wildfire mitigation plan performances has informed this plan.	14
b (2)(F)	Protocols for disabling reclosers and de-energizing portions of the electrical distribution system that consider the associated impacts on public safety, as well as protocols related to mitigating the public safety impacts of those protocols, including impacts	10 (B&D)

SB 901 Requirements	Description	Section Number
	on critical first responders and on health and communication infrastructure.	
b (2)(G)	Appropriate and feasible procedures for notifying a customer who may be impacted by the de-energizing of electrical lines. The procedures shall, direct notification to all public safety offices, critical first responders, health care facilities, and operators of telecommunications infrastructure with premises within the footprint of potential de-energization for a given event.	10 (D), 11
b (2)(H)	Plans for vegetation management.	9 (A)
b (2)(I)	Plans for inspections of POU’s electrical infrastructure.	9 (B)
b (2)(J)	<p>A list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks, throughout POU’s service territory. The list shall include, but not be limited to, both the following:</p> <ul style="list-style-type: none"> <li>i. Risks and risk drivers associated with design, construction, operation, and maintenance of POU’s equipment and facilities</li> <li>ii. Particular Risks and risk drivers associated with topographic and climatological risk factors throughout the different parts of POU’s service territory</li> </ul>	4
b (2)(K)	Identification of any geographic area in POU service territory that is a higher wildfire threat than is identified in a California Public Utilities Commission (CPUC) fire threat map, and identification of where the CPUC should expand a high fire threat district based on new information or changes to the environment.	N/A
b (2)(L)	A methodology for identifying and presenting enterprise wide safety risk and wildfire-related risk.	2
b (2)(M)	A statement of how the POU will restore service after a wildfire.	10(D), 11

SB 901 Requirements	Description	Section Number
b(2) (N)	<p>A description of the processes and procedures the POU shall use to do all of the following:</p> <ul style="list-style-type: none"> <li>i. Monitor and audit the implementation of the WMP</li> <li>ii. Identify any deficiencies in the WMP or its implementation, and correct those deficiencies</li> <li>iii. Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractor that are carried out under the plan, other applicable statutes, or commission rules.</li> </ul> <p>Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, that are carried out under the plan, other applicable statutes, or commission rules</p>	14, 15

This WMP uses the statewide-adopted fire threat map developed by public and private utility agencies and corporations including APU, consistent with practices established by the California Department of Forestry and Fire Prevention (Cal-Fire) and the CPUC to focus efforts on mitigating wildfire. Furthermore, three tiers of FTZs are established within the overall fire threat map ranking, where Tier 3 FTZ with overhead electrical infrastructure are used by APU to prioritize increased infrastructure resiliency and identify operational procedures to reduce the threat of fire ignition. The FTZ tiers are more fully described in Section 5.

To implement the WMP, a matrix identifying persons responsible for executing the WMP, resources utilized to assess field conditions when elevated fire and weather indicators reach certain thresholds, and education and training for field personnel, stakeholders, and the public is located in Section 13. Finally, metrics using historical and incident driven data measure the effectiveness of the mitigation efforts and drive future enhancements.

This WMP is the roadmap to achieve a level of hardening of the electric infrastructure with priority given to Tier 3 FTZ areas. Review and update of this WMP will be performed on an annual cycle to capture additional state legislation requirements, re-assess wildfire hazards, and ensure enhanced technologies are incorporated into the preventative strategies. Performance metrics are updated annually and reviewed for effectiveness. Consistent with state legislation, a more thorough update of the WMP will take place on a three-year cycle.

**SECTION 2- Enterprise-Wide Safety Risk Assessment**

There are various methods to evaluate risk and APU follows the Committee of Sponsoring Organizations of the Treadway Commission (COSO) Enterprise Risk Management - Integrated

Framework. Similar to the risk management standards established by the International Organization of Standardization (ISO) 31000, the purpose is to identify and manage potential enterprise and safety risks, including those associated with electrical infrastructure igniting a wildfire, that could threaten the community, interrupt core business functions, and threaten business continuity or impact recovery.

APU's enterprise risk management framework begins with an organizational structure ranging from Elected and Appointed Officials, Executive Management, Division Managers, and Subject Matter Experts (Risk Owners) who identify credible and foreseeable threats utilizing industry experience, and accounting for APU's unique characteristics and safety assessments. Similar to the "bow-tie" method for identifying where new or enhanced controls may be worthwhile, a repository of identified risks are prioritized based on consequence to the business enterprise, and frequency of occurrence. For each risk, mitigation plans are established, with a Risk Owner identified to oversee implementation and progression of the mitigation measures, and a member of the senior management team who is held responsible and accountable for the risk.

Ongoing efforts of reviewing and revising the risks as new threats evolve keep this process dynamic. APU measures and monitors the effectiveness of the mitigation efforts through various means including the agency-level Utilities Success Indicator report. Examples of safety and wildfire risks include loss of electric service to critical infrastructure, loss of communication connectivity, impacted roadways limiting access in FTZ areas and facilities, and regional grid Public Safety Power Shut-Off events.

Risk drivers related to wildfire potential for electric utilities commonly focus on operational and/or electrical infrastructure, vegetation, resource coordination, and the resulting loss of power to critical facilities. These internal factors are addressed with strategies to mitigate the risk within this WMP. Other risk drivers, including natural elements such as climate change and weather conditions are global and require a dynamic approach using forecasting tools to manage the risk.

### **SECTION 3- Dynamic Climate Change**

According to the U.S. Environmental Protection Agency (EPA), the Earth's average temperature has risen by 1.4 degrees Fahrenheit over the past century, and is projected to rise another 2 to 11.5 degrees Fahrenheit over the next one hundred years. Although these increases are seemingly small changes to the climate, this increase in temperature could result in potentially dangerous shifts in climate and weather. Recorded impacts of the changing climate to the Earth's atmosphere include rain and snowfall patterns that are shifting and changing with more extreme weather patterns starting to become more frequent, resulting in increased floods, droughts, or intense rain, as well as more frequent and severe heat waves. Data from National Oceanic and Atmospheric Administration (NOAA) shows increases in observed sea level rise around the United States and globally. The impacts of climate change can be categorized as economic, environmental, or social.

Economic impacts could result when residences and businesses in the FTZ lose their ability to afford rising fire insurance premiums or cancellation of policies, which in Anaheim include approximately 6,417 structures with heightened exposure to wildfires. The cost for resilient infrastructure, increased labor and maintenance within the FTZ could increase operation and maintenance expenditures for utilities.

Environmental impacts are the result of increased wildfires and on the opposite spectrum, increased potential for flooding from the loss of trees and vegetation to stabilize hillsides. Prolonged periods of drought will likely result in a prolonged fire season, potentially year-round. As a result of the prolonged fire season, the potential for public safety power shut-offs will affect customers throughout the year. Also, the FTZ areas will likely expand from the higher into lower elevation wildland and canyons. The majority of wildland and canyons in Anaheim have been designated as Tier 3 FTZ (see Figure 4- Anaheim Public Utilities Fire Threat Map) and overhead electrical infrastructure within the FTZs have been identified in this WMP along with mitigation strategies.

Social impacts involve public safety and the potential devastation from lives or homes being lost during extreme wildfires. Canyon Fire 2 in October 2017 did not result in any fatalities; however, there were 14 homes destroyed, 44 homes damaged, thousands of people evacuated, and over 9,000 acres burned from the wind-driven event that was initiated from remaining embers from a previous brush fire. As a result, the Anaheim City Council supported certain fee assistance and accelerated permitting to assist homeowners with restoring their lives.

#### **SECTION 4- Overview of Risks and Risk Drivers Related to Wildfires**

As previously mentioned, a repository of wildfire-related risks from utility operations and/or equipment sparking a wildfire were identified and prioritized based on the threat to the community, core business impact, consequences, and risk mitigation path. The “bow-tie” method illustrates this process.

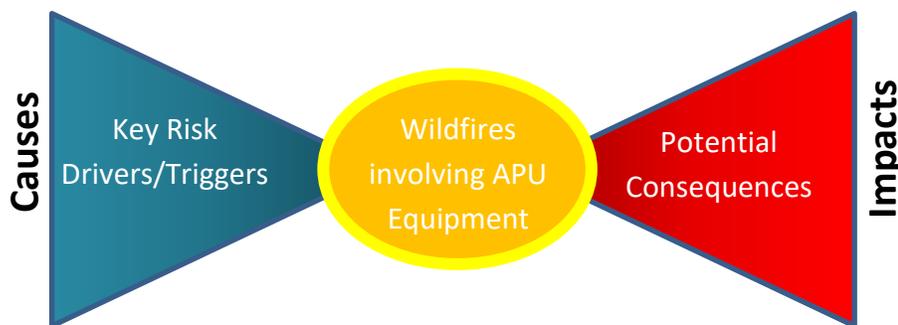


Figure 3. Wildfire “Bow-Tie” Risk Mitigation Chart

Table 2 summarizes the analysis conducted to identify APU’s exposure to, and impacts from a wildfire and to identify current controls and mitigations to reduce the significant risk of a wildfire occurring. It is important to note that the below listed potential risk drivers/triggers are an indication that a risk event could occur, but do not necessarily reflect actual conditions or threatened conditions.

Table 2. Risk Mitigation for Wildfire Ignition

Risk- APU Equipment including Third Party Attachment Igniting a Wildfire		
Potential Drivers	Description of Impact	Mitigation Measures and Programs
Topology	Wildland areas with exposure to overhead power lines.	<ul style="list-style-type: none"> <li>• Vegetation Management</li> <li>• Construction Standards</li> <li>• Water infrastructure reliability improvements to help protect homes near wildland areas</li> <li>• Ensure availability of water in Walnut Canyon Reservoir for water aircraft support</li> <li>• Patrols of utility equipment and structures</li> </ul>
Elevated wildfire conditions	Weather conditions plus topology more conducive to the spread of a wildfire.	<ul style="list-style-type: none"> <li>• Construction Standards</li> <li>• Reclosers Blocking</li> <li>• Wildfire Cameras</li> <li>• Pole Loading</li> <li>• Threat Level Communications and Public Outreach</li> </ul>
Climate Change	Expanding fire threat areas and more extreme weather conditions.	<ul style="list-style-type: none"> <li>• Inventory Assessment in the FTZ</li> <li>• Vegetation Management</li> </ul>
Contact by a foreign object	Vegetation, metallic balloons, avian, vehicle accidents, for example, coming into contact with APU overhead electric facilities.	<ul style="list-style-type: none"> <li>• Construction Standards</li> <li>• Avian Deterrents</li> <li>• Conductor Spacing</li> <li>• Undergrounding</li> </ul>
Failure of Equipment	Electrical equipment containing flammable material or potential for arcing when operated in a FTZ.	<ul style="list-style-type: none"> <li>• System Inspection</li> <li>• System Patrols</li> </ul>
Downed Conductors including Third Party attachments	Energized electrical wires falling and coming into contact with vegetation below.	<ul style="list-style-type: none"> <li>• System Inspection</li> <li>• System Patrols</li> <li>• Reclosers Blocking</li> <li>• Vegetation Management</li> <li>• De-Energize Equipment</li> <li>• Undergrounding</li> </ul>
Energized lines coming into contact	Multiple energized lines in contact with each other creating arcing and sparking in dry conditions.	<ul style="list-style-type: none"> <li>• Construction Standards</li> <li>• Conductor Spacing</li> <li>• De-energize Equipment</li> </ul>
Operational Procedures	Automatic operations to re-energize a line after an interruption or programmable settings that de-energize during specific conditions.	<ul style="list-style-type: none"> <li>• Reclosers Blocking</li> <li>• Public Safety Power Shut-off</li> <li>• Notification to AF&amp;R emergency operations to determine necessity of activation of local Emergency Operations Center (EOC) and establishment of incident command</li> <li>• Evacuation Assessment</li> <li>• Initiate citywide communications and public outreach</li> </ul>

Risk- APU Equipment including Third Party Attachment Igniting a Wildfire		
Potential Drivers	Description of Impact	Mitigation Measures and Programs
		<ul style="list-style-type: none"> <li>Staffing of 311 Call Center to assist with customer inquiries</li> </ul>
Lack of Coordinated Response	When ignition is identified, a well-coordinated response to suppression and de-energizing lines to limit progression of the fire.	<ul style="list-style-type: none"> <li>Customer Support and Emergency Response coordination with local and regional first responders</li> <li>Coordination with SCE</li> <li>Staffing of EOC and inter-departmental collaboration on traffic, emergency management, and communications</li> </ul>

The potential consequences if the risk drivers listed above were to occur and resulted in an incident, in a “worse-case-scenario”, could include:

- Personal Injury to the public, employees, and contractors
- Damage to real and personal property
- Damage and loss of City of Anaheim owned assets and facilities
- Reliability impacts
- Reputational damage
- Claims and Litigation

As an overview of the WMP, the preventative strategies discussed further in the WMP are mapped to these potential risk drivers in Table 3 and placed in one or more of the following categories: (1) Situational Awareness, (2) Design and Construction, (3) Inspection and Maintenance, (4) Operational Practices, and (5) Response and Recovery.

Table 3. Categorization of APU Potential Wildfire Risk Drivers, and Corresponding Preventative Strategy

Risk Driver	Categorization	Assessment/ Preventative Strategy
Topology	Situational Awareness	Section 5,6
Elevated Wildfire Condition	Situational Awareness	Section 5,6,7
Climate Change	Situational Awareness	Section 3
Contact by Foreign Object	Design & Construction/Response & Recovery	Section 9(e)
Failure of Equipment	Design & Construction/ Inspection & Maintenance	Section 9(b-d) Section 10(a)
Downed Conductors including Third Party attachments	Design & Construction/ Inspection & Maintenance	Section 9(b-d) Section 10(a)
Energized lines contact together	Design & Construction	Section 9(c,d)
Operational Procedures	Operational Practices	Section 10(a-e)
Lack of Coordinated Response	Response & Recovery	Section 11,12,13

## SECTION 5 - Assessment of High Fire Threat in APU's Electric Service Territory

A statewide fire threat map was developed to delineate the boundaries to identify, evaluate, and potentially adopt stricter fire-safety regulations that apply only to overhead power lines, electric equipment, and communications lines located within those boundaries. The map was developed by a peer group of utility personnel and fire safety professionals known as the Peer Development Panel (PDP) with the oversight by an Independent Review Team (IRT) appointed by Cal-Fire and the CPUC.

Tiered FTZs within the fire map boundaries are developed based on the Cal Fire “Very High Fire Hazard Severity Zones” (Cal Fire Map) in Anaheim to prioritize the need to increase infrastructure resiliency to mitigate the wildfire threat posed by electric infrastructure. Based on Anaheim’s review, there are no additional wildfire threat areas within the service territory that hasn’t been identified in this Cal Fire Map. APU and AF&R, with outreach to Southern California Edison and the Orange County Fire Authority, developed the Anaheim FTZ boundaries, Figure 4--Anaheim Public Utilities Fire Threat Map, which was reviewed by the PDP and adopted by the IRT in September 2017. APU and AF&R review the map annually and on as-needed basis to address any changes to the FTZs and have determined that there is no need to expand the Tier 2 or Tier 3 FTZs at this time. The map was established based on criteria for FTZ tiers listed in Table 4.

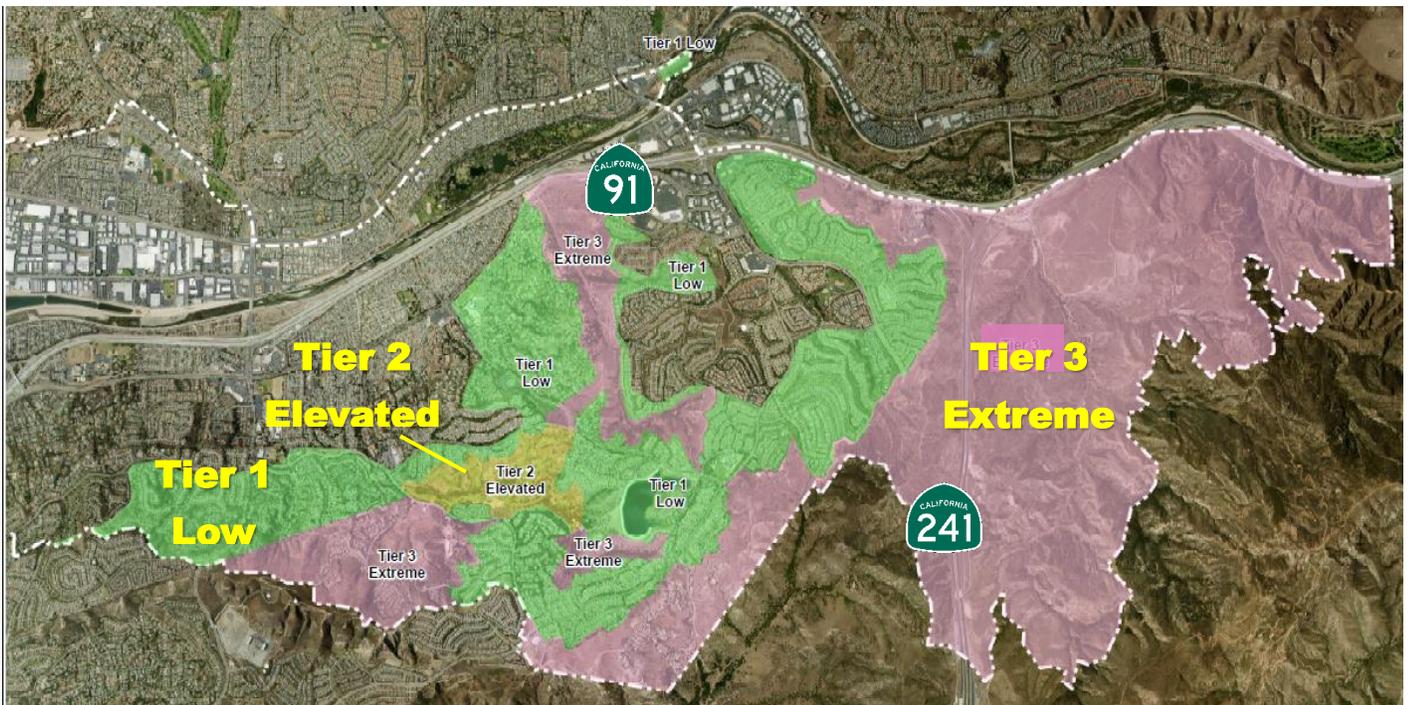


Figure 4. Anaheim Public Utilities Fire Threat Map

Table 4. Tiered Fire Threat Zones in Anaheim

<b>Zone</b>	<b>Category</b>	<b>Description</b>
Tier 3	Extreme	Typically wildland areas where exposure to overhead power lines, the availability of water resources, and emergency responder circulation routes affect response times to combat wildland fires.
Tier 2	Elevated	Elevated risk due to the vegetation, high voltage regional transmission lines crossing the area, and adjacency to Tier 3 FTZs.
Tier 1	Low	Well developed areas, typically with underground high voltage circuitry.

Topography has a considerable effect on wildland fire behavior and on the ability of fire fighters and their equipment to take action to suppress wildland fires. Due to topography, a fire starting in the bottom of a canyon may expand quickly to the ridge top before initial fire responders can arrive. Rough topography greatly limits road construction, road standards, and accessibility by ground equipment. A relatively large portion of East Anaheim is covered by natural vegetation. Of these different vegetation types, coastal sage shrubs, chaparral, and grasslands reach some degree of flammability during the dry summer months and, under certain conditions, during the winter months. For example, as chaparral gets older, twigs and branches within the plants die and are held in place. A stand of brush 10 to 20 years of age usually has enough dead material to produce fire spread rates about the same as in grass fires when the fuels have dried out. In severe drought years, additional plant material may die, contributing to the fuel load.

There will normally be enough dead fuel that has accumulated in 20 to 30-year old brush to give fire spread rates about twice as fast as in a grass fire. Under moderate weather conditions that produces a fire spread rate of one half foot per second in grass, a 20 to 30-year old stand of chaparral may have a fire spread rate of about one foot per second. Fire spread in old brush (40 years or older) has been measured at eight times as fast as grass, at about four feet per second. Under extreme weather conditions, the fastest fire spread rate in grass is 12 feet per second or about eight miles per hour. Anaheim is relatively flat with the exception of the eastern portion of Anaheim where the Wildland Urban Interface (WUI) presents greater risk of wildfire.

To manage surface fuel in the FTZ, AF&R manages the Brush Abatement Program which is divided into three phases:

- Phase I Natural Brush Abatement- The use of goats to remove flash & invasive fire fuels.
- Phase II Mechanical Brush Abatement- The use of machinery and tools to trim existing trees and brush 10 from the ground, and remove dead and invasive trees and shrub
- Phase III- To replant with native plants and shrubs to reestablish nature’s natural fire break.

Within Anaheim’s boundaries there are four Tier 3 FTZs; these areas are exposed, generally steep north facing slopes with coastal sage shrubs and mixed chaparral. Areas designated Tier 3

contain two sections of pole lines totaling approximately one mile, which is a small portion of overhead 12 kV pole lines traversing the terrain which warrants the need for increased infrastructure resiliency to reduce fire risk.

The first segment of overhead 12 kV line traverses a Tier 1 FTZ and a portion of the line crosses into a Tier 3 FTZ along a narrow, private roadway that makes it difficult for emergency vehicles to access. The WMP was initially approved by City Council in 2018 that included a recommendation to underground this segment of overhead line as part of the Underground Conversion Program and in the interim, apply the preventative and operational strategies outlined in this WMP to mitigate fire risk. This segment is subject to potential power shut-offs until future undergrounding occurs. A community meeting was held in October 2018 to inform the residents that 8 households could be affected from a Public Safety Power Shutoff (PSPS) event, but that mitigation measures were taken and future undergrounding was planned. The undergrounding project was approved by City Council resolution, and it included telecommunication providers to eliminate the poles completely; however, AT&T has declined to underground this segment at its expense through its Rule 32A citing that this roadway does not meet the definition of an eligible project as currently defined, and APU is therefore seeking CPUC consideration for AT&T's full participation and funding of this important segment to reduce wildfire risk and improve vehicle accessibility for fire and utility trucks.

The second segment is an overhead 12 kV line that traverses through a natural park and has varying elevations of terrain that would be highly disruptive to the natural setting if underground excavations took place, and would be difficult to access if underground equipment were to be installed. The construction of this line was reinforced for increased resiliency with the installation of 27 ductile iron poles and increased spacing between conductors. To preserve the natural habitat of the woodpecker birds in this area, some wood poles were left standing as perches with all electric conductors and equipment detached. Additionally, this segment is a circuit-tie and does not serve customers and is therefore de-energized in its normal status. The protocol has been established for visual inspection of this line prior to re-energization, and to use the line for reliability purposes including emergency power restoration when environmental conditions warrant.

Seven small segments of 12 kV overhead line traverse through areas designated Tier 1 and adjacent to Tier 2 FTZ. Vegetation clearance is currently maintained following the vegetation management practices (see Section 9), and due to the moderate risk associated with Tier 2 FTZ, the line will be patrolled annually to ensure those clearances are maintained. APU partnered with Anaheim Fire & Rescue to apply for grant funding to help offset the cost and accelerate the undergrounding of these lines.

Tier 1 FTZ areas are categorized as low risk, as the areas are served through predominantly underground lines. These areas are well developed and have access to fire hydrants, with roadways that are accessible to fire and utility personnel.

Also located within the Tier 1-3 FTZ are Southern California Edison's (SCE) high voltage overhead 500 kV transmission lines which serves as one of several interconnection paths for Anaheim to the regional power grid. SCE is subject to regulatory oversight by the CPUC, who will review and approve SCE's wildfire mitigation plan to address its transmission assets, including the areas that pass through Anaheim. APU coordinates with SCE on situational awareness of fire conditions, as well as operational activities that may include SCE de-energizing

the high voltage transmission lines. The impact to Anaheim is mitigated since there are multiple transmission lines that serve Anaheim.

## SECTION 6- Asset Inventory in Fire Threat Zones (FTZ)

Overhead electrical infrastructure located within the FTZ are listed in Table 5. Additionally, resources including water pumps, communication stations, and customers with medical needs are considered when planning operational strategies to minimize risk of ignition sources by de-energizing electric lines as an example.

Table 5. Tier 3 Fire Threat Zone Assets

Source	Asset	Tier 3 (Extreme)	Tier 2 (Elevated)	Tier 1 (Low)	APU Total
APU Electric Distribution in FTZ	Circuit Miles	1.06	.04	1.94	394
	Poles	38	7	79	17,100
	Overhead Transformers	10	0	26	7,250
SCE Electric Transmission in FTZ	Circuit Miles	2.60	0.95	0	
	Towers	20	6	0	
APU Water Treatment in FTZ	Pump Equipment	2	0	0	2
Communications	Cell tower	0	0	0	

## SECTION 7- Overview of Preventative Strategies and Programs

Table 6. Preventative Strategies and Programs

<b>Situational/Conditional Awareness</b>
Collaboration with AF&R, Fire Safe Councils and OCFA in preparation for RFW and SAWTI events.
Fire cameras installed in Anaheim's Tier 3 FTZ and connected to the regional network AlertWildfire.org
Weather monitoring stations installed in FTZ and network access for local weather station data.
Training for AF&R Dispatch Center and APU Operators in fire camera view and operations.
Daily monitoring and reporting of elevated fire conditions including RFW and SAWTI.
On-site visual inspection by APU troubleshooter and CERTS during elevated conditions.
Training for APU Operations Reclosers Disabling.
Training for APU Operations De-energize/Restore protocol and communications.
<b>Design and Construction</b>
Installation of Fire Monitoring Cameras in the FTZ.
Installation of Weather Monitoring Stations in the FTZ.
Modified Construction Standards for FTZ.
Wood to Ductile Iron pole replacement.
Concealed lightning arrester replacement.
Insulated covers on equipment mounting brackets.
Increase overhead wire spacing.
Increased wind loading for pole strength and integrity.
Installation of avian diversion equipment.
Non- expulsion fuse devices for line protection
Undergrounding electric lines in FTZ.
<b>Inspection and Maintenance</b>
Vegetation Management- Line Clearance
Surface fuel management
Vegetation tracking and recording
Detailed distribution overhead and underground line and infrared thermography inspection
Distribution wood pole intrusive testing
Visual inspection and infrared thermography of distribution substations
Substation equipment oil sampling
<b>Operational Practices</b>
Overhead Distribution line patrols
Disabling reclosing during elevated fire conditions
Independent fiber-optic communication network
De-energized power lines through Oak Canyon Nature Center
<b>Response and Recovery</b>
Wildfire Mitigation Response Procedures- Operation and communication protocols including PSPS
Communication strategy for de-energize/restore response.
Emergency Response planning for Stakeholder support during a PSPS.
Field Operations recovery procedures
Post event customer support and protection services
Modifications to policies, practices, and procedures
Waiver of electric and water service connection fees
Waiver of electric and water design/engineering, plan checks, and inspection fees
Impacted customer payment extensions, payment plans
Irrigation controllers provided at no cost to extend longevity of landscaping.

## **SECTION 8 - Situational Awareness**

In Southern California, the period for active fire conditions can exist year-round; however, conditions contributing to a higher risk of a fire igniting and spreading is attributed to the amount of dry fuel sources, high winds, relative low humidity, and dry lightning conditions. APU collaborates with multiple stakeholders including, but not limited to, AF&R, the APU Water Division, the National Weather Service, and adjacent electric utilities including SCE and San Diego Gas and Electric (SDG&E) to leverage situational awareness, camera networks, web-based real-time monitoring data from local weather stations, and fire condition warning systems that gauge fire threat conditions so APU can mobilize personnel and take specific actions to mitigate a higher fire threat.

AF&R provides daily assessment of conditions classified as Normal, Elevated, Extreme, and Red Flag Warning conditions for mountainous (East Anaheim) areas. A Red Flag Warning (RFW) is issued for weather events which may result in extreme fire behavior that will occur within 24 hours. A RFW is typically issued when relative humidity is at or below fifteen percent (15%) and sustained winds are expected to reach twenty-five miles per hour (mph) or higher and/or wind gusts exceed 35 mph for six or more hours. Also, lightning under dry conditions will typically trigger a RFW. At the onset of the RFW for the mountainous areas, AF&R notifies APU and deploys fire watchers for on-site assessment of conditions. The RFW for the mountainous areas most closely correlate with the Anaheim Tier 3 FTZ and where utility overhead infrastructure is located.

In conjunction with the RFW, another early warning system is the Santa Ana Wildfire Threat Index (SAWTI), which was developed through collaboration with Cal-Fire, UCLA, the National Forest Services, the National Weather Service, SDG&E, and the Desert Research Institute, that classifies the large fire threat potential from Marginal to Extreme based on the likelihood of a catastrophic wildfire fueled by high winds. High winds contribute to increased dry fuel source, but also can cause power lines to come into contact with each other and produce a spark which potentially can cause a fire ignition. APU monitors and reports the SAWTI for Zone 2 - Orange/Inland Empire on a daily basis to key personnel.

Forecasts and weather indexes are early-warning tools to proactively prepare for events; however, real-time monitors tracking the changing dynamics of an event can refine key decisions impacting response times. High resolution cameras and weather stations are utilized in Anaheim for this purpose.

AF&R and APU jointly evaluated a regional network of fire cameras that is being deployed in the FTZ to provide high resolution video, near-infrared capabilities, and the ability to zoom into areas to more quickly identify ignition points. Because wildfires spread rapidly in windy conditions, the ability to recognize and respond expeditiously can make a significant difference in saving lives and properties.

AF&R and APU joined with University of California San Diego-Scripps (UCSD) to become part of this regional network of fire cameras and to include locations in Anaheim through an agreement approved by Anaheim City Council on May 14, 2019. This allows access to the larger regional system that spans from San Diego and Orange Counties, and further north to Central California, and into Nevada. This regional network is owned and managed by UCSD-Scripps, with network partnerships including SDG&E, SCE, Orange County Fire Authority (OCFA) and

Cal-Fire. This network will provide AF&R Dispatchers and APU Operators with the ability to view camera images, and provide additional capabilities to AF&R to remotely control the cameras and more quickly verify an ignition while environmental conditions are being monitored in real time. AF&R can more quickly validate 911 calls reporting a fire by first using the cameras and then deploy the necessary resources based on the visual information. These cameras are now part of the Alertwildfire.org regional public access network of high resolution cameras used by fire agencies as a topographical visual tool for scouting fires.

The link for public access of regional network of fire cameras is is: <http://www.alertwildfire.org/>



Figure 5 (a) Alertwildfire.org portal



Figure 5 (b) High Resolution Camera Installation and Camera Image Overlooking Anaheim



Figure 5 (c) Anaheim Camera Image of 91/241 Freeway Interchange

Anaheim strategically placed one of its Pan-Tilt-Zoom (PTZ) cameras to capture real-time situational awareness in Gypsum Canyon, the originating location for the 2017 Canyon Fire 2. A second camera was installed at a substation to provide a different vantage point. Two additional locations have been identified and verified that they can accommodate the network requirements for the cameras and are being coordinated with UCSD Scripps for installation.



Figure 5 (d) Camera locations that provide strategic vantage points of Anaheim FTZ's

The network provides access to existing cameras on locations that provide strategic vantage points along Santiago Peak, Pleasants Peak, and Sierra Peak in addition to the Anaheim cameras viewing Gypsum Canyon and Deer Canyon for a 360 degree view of the FTZ.

Weather stations that gauge wind conditions and humidity levels are located at the Orange County Water District (OCWD) facility, Fairmont Substation and a third planned location at the Lenain Water Treatment facility in East Anaheim, to be installed in 2020 within a Tier 3 FTZ. The data is used by AF&R and APU to direct resources and make operational decisions based on the measured peak wind gust. In addition to the fire camera network, a network of local weather station data is publicly available through the National Weather Service /NOAA Weather and Hazards Data Viewer. Within Anaheim, there are approximately 9 weather stations through partnerships with SCE, the California Air Resources Board (CARB), and the Citizen Weather Observer Program (CWOP).

The Alertwildfire.org network cameras and weather stations are monitored by the AF&R Dispatchers and utilized as another real-time data source for monitoring fire threat conditions, and where appropriate, warrant APU operational actions that are discussed in this WMP. The fire cameras proved to be very useful to AF&R in October 2019 during the Contempo Fire that ignited in the FTZ in East Anaheim, south of the 91 freeway near Coal Canyon. The recently installed cameras were used to help verify ignition, direct aircraft, and position ground crews to keep the wildfire from spreading and was contained to only 5 acres. The illustration below depicts the image captured by AF&R Dispatch of that wildfire from the cameras.



Figure 5 (e) Anaheim Camera Image of Contempo Wildfire 10-26-2019

## **SECTION 9- Preventative Strategies for Building Infrastructure Resiliency**

The goal of the WMP is to minimize the risk of electric infrastructure being a contributing factor to the ignition of a wildfire. A prudent approach is taken to consider and, where appropriate, implement changes and improvements to physical infrastructure that are practical preventative measures in construction and maintenance practices to meet that goal. APU utilizes established guidelines and industry best practices for safe design and construction of the electric distribution system, using resources such as the CPUC General Orders (GOs). GOs outline safe clearances, integrity of construction, and maintenance requirements to achieve a level of infrastructure resiliency to withstand elevated to extreme environmental conditions.

### **A. Vegetation Management**

For the safety and reliability of service where overhead conductors traverse trees and vegetation, APU performs vegetation management activities consistent with the guidelines outlined in GO 95 – Rules for Overhead Electric Line Construction, Section III - Minimum Allowable Clearances -Extreme and Very High Fire Threat Zones in Southern California, to establish necessary and reasonable clearances between the vegetation and the energized conductors in a Tier 3 FTZ. GOs are technical requirements established by the CPUC for investor owned utilities and are utilized by APU as best industry practice for utility operation and construction. Additionally, dead or rotten trees and brush at risk of falling into energized conductors are inspected, identified, and removed as needed. Clearances are increased around overhead power lines in high risk fire areas where the combination of high wind potential and dry vegetation may increase the risk of fire ignition. The definitions of Extreme and Very High Fire Threat Zones in Southern California are contained in GO 95 Rule 21.2, and reference the adopted CPUC Fire-Threat Map which is consistent with the AF&R adopted CAL-FIRE map.

Studies of the most recent wildfires indicate there are approximately ten species of trees that have been responsible for 75% of the past fire ignitions in California. Anaheim tracks the location, species, condition, and trimming schedule for trees near power lines in the Tier 3 FTZ to maintain a defensible space. The attributes of the tree and GPS coordinates are archived in Geographic Information System (GIS) mapping, and annual inspections and trimming appropriate for the growth pattern of that species is recorded. Figure 6 depicts the attributes recorded for each tree within the FTZ.



visible signs that maintenance or replacement is warranted. Oil samples of substation transformers are tested annually for anomalies such as rising gases or moisture contaminants that could lead to pre-mature failure of the equipment.

There are three maintenance condition levels. They are prioritized based on probable impact on safety or reliability, taking into account several factors. These factors include facility or equipment type and condition, loading, location, accessibility, and direct or potential impact on safety or reliability. The three conditions and their priority levels are:

Condition Level “1”: Maintenance required. Repair or replace within 90 days. If there is an imminent safety or reliability problem, the inspector should contact Electric Operations for confirmation with field personnel and to identify and schedule mitigation procedures.

Condition Level “2”: Maintenance needed but deferrable, no immediate safety or reliability concern.

Condition Level “3”: Minor aging, fully serviceable, no safety or reliability concern. Appropriate for next scheduled inspection.

Those maintenance items that pose the greatest public safety or system reliability risks will either: (a) be repaired immediately or (b) if the repair proves too complex to complete immediately or requires materials that are unavailable, a temporary repair will be made to address the risks, and the item will be reprioritized for repairs to be completed at a later date. For infrastructure located within the Tier 3 FTZ, equipment identified as needing maintenance during an inspection cycle will be designated at the highest priority Condition Level 1.

Results from the latest inspection cycle included 72 of the 86 wood poles in the FTZ that met the GO 165 criteria were intrusively tested, and the remaining 14 were visually inspected with no findings of deterioration.

To monitor if the inspections performed by a third party are effective in identifying and preventing potential future problems, each power outage caused by electric equipment failure is investigated for signs of premature deterioration that warrant recording in the inspection report. Equipment is tracked by an identifying number, for example PM- 500 is a pad-mounted switch numbered 500 of 800 total switches throughout the system. If this switch were to fail with no other cause identified, the switch would be inspected to determine whether there were visible signs that should have been identified during an inspection cycle. To date, there have been no instances where equipment within the FTZ has failed with root cause determined to be an inspection oversight.

### **C. Construction Standards**

Specific to resiliency of the electric system to withstand extreme conditions, GO 166 – Standards for Operation, Reliability and Safety During Emergencies and Disasters establishes construction standards to withstand 3-second wind gusts that exceed the maximum structural or mechanical design specified in standard construction of electric distribution lines, as outlined in GO 95. This applies to overhead electric facilities located in geographic areas designated as the first or second highest fire threat area, at the time and place of a RFW. To establish a measured peak wind gust, APU utilizes historic data collected from the weather stations at Linda Vista Reservoir and

Fairmont Substation located closer to the Tier 3 FTZ and near the applicable overhead electric infrastructure. APU construction standards for overhead infrastructure including poles, conductors, switches, connectors, and grounding in the Tier 3 FTZ have been modified to incorporate design and construction to sustain that highest measured 3-second wind gust. For example, 27 wood poles have been replaced with ductile iron poles in and through the Oak Canyon Nature Preserve, and pole loading and clearance between lines have been improved in this location.

Lightning arresters are typically placed where an energized conductor terminates at a pole. When lightning strikes a conductor, there is a high voltage spike along the conductor and the arresters limit the potential for a flash over near a grounded pole. During normal conditions, animals may perch on the cross-arm or on the bracket the arrester is mounted to and have been observed to store food source in the opening of the arrester where the energized high voltage conductor enters. These arresters have been replaced with a concealed version eliminating the entry point to an energized part as shown in Figure 7. In addition, the grounded bracket supporting the arrester is also wrapped to further the distance between the conductor and grounded equipment.

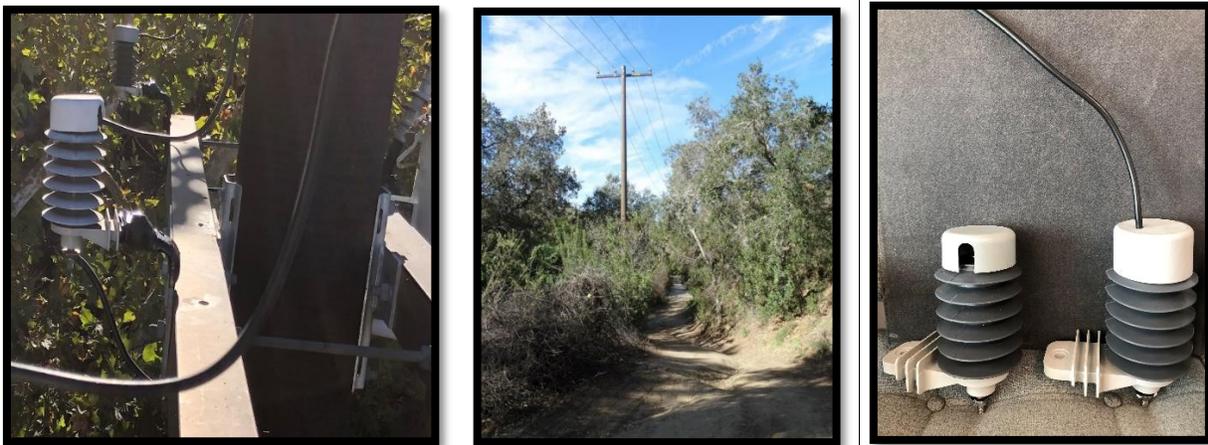


Figure 7 (a) Concealed lightning arrester (b) ductile iron pole (c) comparison of lightning arrester models

Evaluation is in progress for transitioning to a vegetable (ester)-based insulating oil, for example a soybean-oil referred to as FR3, rather than the current standard mineral-oil for overhead transformers within the FTZ. The vegetable-based oil test data indicates a higher fire point to withstand a higher temperature before the oil continues burning. APU will evaluate the merits in terms of fire safety offered by this feature.

#### **D. Pole Loading and Wire Spacing**

APU is primarily the owner of the power poles throughout Anaheim, and is a participant in the Southern California Joint Pole Committee that allows members to mutually allocate space on the pole among agencies to attach equipment to provide service, including electric, telecommunications, and cable companies. APU allows for a total maximum weight attached onto the pole using standard guidelines established in GO 95, Section IV. Wind parameters for calculating pole loading were increased from 8 lbs. to 12 lbs., exceeding the GO 95 standard, and has been assessed for all poles within or adjacent to the FTZ. The pole line within the Tier 3 FTZ that traverses the Oak Canyon Nature Preserve does not have telecommunication

attachments and does not serve customers. These poles were replaced with ductile iron poles able to withstand even higher wind parameters.

Spacing between wires attached to cross arms mounted on the poles are also increased for energized overhead lines located in or adjacent to the Tier 3 FTZ. The increased clearance reduces the potential for wires to contact each other during Santa Ana wind conditions.

### **E. Contact by Foreign Objects**

Animals have come into contact with energized overhead power lines, fallen to the ground, and ignited brush beneath the power lines and at the base of poles. APU has taken a number of measures to mitigate this risk through a combination of vegetation management, increasing wire spacing, and insulating energized parts at the pole. The concern with use of insulated overhead wire for this scenario is the possibility of the bird still becoming entangled in the wires, particularly at night. APU has installed devices on the conductors themselves to deter the flight path of the birds (see Figure 8 below). These devices work in two ways, one that allows the bird to “bounce” away from the conductor rather than becoming entangled and/or making phase to phase contact with high voltage power lines. The other method, utilizes a device hung on the conductor itself with a flashing light to alert birds during the night that an obstruction is ahead. These measures have been installed on overhead conductors within an APU service area prone to avian contact and if metrics indicate positive results, will plan to continue use of these measures as an alternative to use of insulated wires.

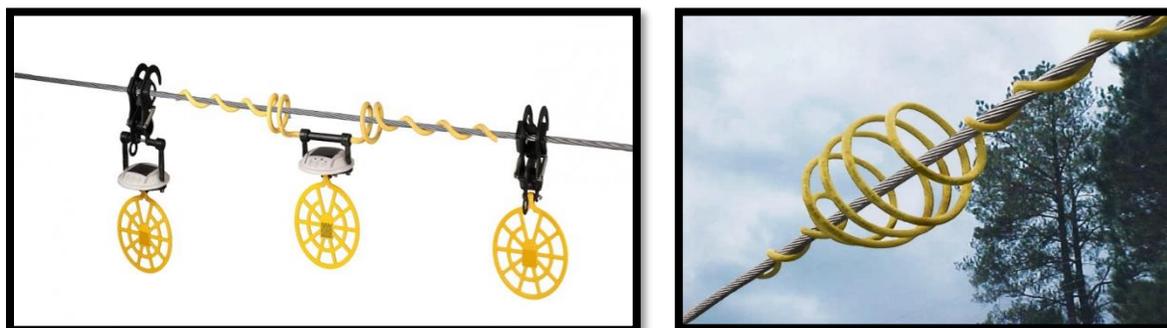


Figure 8 (a) raptor clamp with LED light (b) swan-flight diverter

A major cause of power outages utility-wide are the result of metallic balloons contacting electrical lines when released. The conductive material can cause sparking and when deflated, can fall to the ground, leading to the potential for fire ignition. Non-conductive balloons are used by some retailers, while others are reluctant to transition from metallic materials. Senate Bill 1990 (1990) and Assembly Bill 2450 (2018) passed mandating weighting down the metallic balloon and labeling of the supply chain; however, metallic balloon contact with power lines continue to be a potential wildfire risk.

APU will continue to educate customers through public service announcements and promote proper disposal of metallic balloons to reduce wildfire risk.

### **F. Non-Expulsive Fuse Devices**

Fuses (Fusing) refer to protective devices that protect the distribution system from faulted or damaged lines and equipment. Historically, APU, other utilities in California, and utilities across

the country have used conventional fuses to protect power lines. These conventional fuses, when operated, expel hot particles and gases, which have the potential to start fires. In order to mitigate the potential for fire ignitions, non-expulsive fuses may be installed to replace expulsion type fuses. Fuse manufacturers now provide current-limiting with self-contained design that eliminate expulsive showers associated with expulsion fuse operation. These non-expulsive fuses are more suitable for FTZs. Many of these fuses have been granted permanent exemption by the California Department of Forestry and Fire Protection (CAL FIRE) from pole clearance requirements if installed in the field according to manufacturer's specifications.

APU currently has 31 locations within the FTZ (Tiers 1-3) that have expulsive fuse units. APU has initiated a pilot test of 6 non-expulsive units within the FTZ, using a fuseless lateral line mounted recloser that uses vacuum interrupters that can be placed in non-reclose mode. The devices do not produce hot debris or a spark, having met CAL FIRE exemption status. Following the pilot testing, non-expulsive fuses will be deployed based on prioritized wildfire risk assessments.

### **G. Undergrounding Power Lines**

Approximately 98% of the 140 circuit miles of APU-owned power lines in the Tier 1-3 FTZ are currently underground, which significantly reduces the overall risk to the community. APU assets within the Tier 3 FTZ include approximately 1.06 circuit miles of overhead distribution power lines. Over 60 % of the 1.06 circuit miles of overhead line is de-energized under normal conditions as this portion of the line does not serve customers. The line is used only as a tie-point between two circuits for redundancy, and is patrolled and maintained as if energized. The remaining 40% of the overhead line traverses through a residential area adjacent to Deer Canyon, a Tier 3 FTZ. APU and various telecommunication companies have overhead facilities co-located on utility poles.

APU evaluated use of insulated conductor for the 0.5 circuit mile segment however it requires replacing poles, additional guying support and easements and decided undergrounding the line was more prudent. On July 30, 2019, the City Council approved the Anaheim Public Utilities Underground Conversion Program Five-Year Plan which includes the undergrounding of this approximately 0.5 circuit miles of overhead line in the Tier 3 FTZ. The street is very narrow so undergrounding will also help with large utility and fire vehicle access. The project is in design and construction expected to commence in summer 2020 with expected completion prior to the third quarter of 2021.

## **SECTION 10- Operational Strategies to Reduce Risk of Wildfire Ignition**

Construction methods for fire-hardening infrastructure, pro-active equipment replacement, system inspection, and preventative maintenance are essential components of a resilient electric distribution system, but there are additional strategies to mitigate the risk of operating an electric system within areas where high fire threat exists. As forecasted ambient temperatures rise, humidity levels drop and/or Santa Ana wind conditions are prevalent, these operational strategies will take effect to further reduce the potential for wildfires within the Tier 3 FTZ.

## **A. System Patrols**

A patrol is a visual inspection of applicable utility equipment and structures that is designed to identify obvious structural problems and hazards. System patrols occur on a routine basis to ensure that immediate issues are detected and addressed as quickly as possible. Patrols differ from detailed inspections which are performed for more of a diagnostic and proactive evaluation of equipment conditions.

During forecasted elevated ambient temperatures or RFW and high wind conditions, utility staff will be dispatched to patrol the overhead infrastructure in the Tier 3 FTZ as a precautionary measure or utilize AF&R Community Emergency Response Teams (CERTS) already out on patrols for multiple purposes to provide visibility on electric infrastructure. Annual patrols of applicable utility equipment and structures in urban areas are conducted by APU. The entire system is patrolled annually by electric troubleshooters to identify where wood poles, cross arms, or other equipment are in need of repair or replacement, and equipment or lines in need of clearance from vegetation.

## **B. Circuit Reclosers**

Microprocessor-based protective relays are used within substations to detect faults on the electric lines and signal to the substation circuit breaker to disrupt power on a circuit before damage occurs to major equipment. Once the circuit breaker has opened and disrupted power, the protective relay is programmed to signal the circuit breaker to “reclose and test” if the cause of the fault is still present or if it was momentary when, for example, a broken tree branch falls and clears the lines. If the cause is still present, the reclose function is automatically disabled and the circuit breaker will remain open with power disrupted until crews make repairs and return the system to a normal condition. The reclose and test method allows for a shorter outage duration and less impact to service when the fault is momentary. During extreme fire conditions when the area is in RFW and/or SAWTI indicates wind speeds are excessive, APU operators will disable the automatic reclosing capability of the protective relays for lines located within the FTZ as a precautionary measure, consistent with industry practices in California. Four distribution circuits have been identified as subject to disabling the reclosing function during these elevated fire and weather conditions. In addition, if these identified circuits should experience a fault and relay, they will not be re-energized until a visual inspection has been performed.

## **C. Communication Network**

APU operates and maintains critical software applications on computer servers with higher capacity and resiliency for remote operation and protection systems like circuit reclosers. The communication network used to support these systems is an independent fiber-optic communication network owned and maintained by APU. The fiber-optic system is a point-to-point network with redundancy for added flexibility to re-route the communication path in the event of damage, significantly increasing the reliability for remote communication critical to the automated protection systems. The fiber system is underground in the Anaheim FTZ.

**D. De-Energize and Restore Power Lines**

APU serves 120,000 customers within the service territory. The potential for de-energizing power to APU customers is extremely remote; however, if becomes necessary to initiate a PSPS, that would only impact the 0.5 circuit miles of overhead line serving eight residential customers in total, with no critical health care facilities, nor commercial businesses impacted. Under a RFW event in combination with an extreme level SAWTI, APU will de-energize this pole line that poses a potential threat within the Tier 3 FTZ.

Operational and communication protocols for de-energizing power lines impacting these eight residential customers, referred to as a PSPS are documented in APU’s wildfire mitigation response procedures. The residential customers affected by de-energized lines will be contacted in person and by phone, text, and electronic mail by APU staff. In situations where AF&R or other public safety first responders initiate an evacuation of an area, APU will coordinate with the City Public Information Office to keep the media and general public informed, if power has been de-energized as a precautionary measure. Operational and communication protocols are also in place to restore power after a PSPS. Prior to restoring electricity to the de-energized line, a patrol of the overhead infrastructure will be completed to verify there are no potential safety hazards.

Coordination between APU and AF&R occurs on a routine basis for structure fires whether or not there is an elevated wildfire risk. Proper precautions are taken to ensure safety of the public, AF&R fire crews, and utility personnel when fighting any fire where structures are at risk. A citywide safety committee includes relevant departments including City Safety, AF&R, Anaheim Police, Public Works, and APU to collaborate on safety matters on a quarterly basis.

**E. Summary of Operational Strategies**

Table 7 is a summary of operational strategies to be implemented during elevated weather conditions.

Table 7. Operational Strategies

Operating Strategies	Elevated Temperatures	Red Flag Warning (RFW)	Santa Ana Wind Threat Index (SAWTI) Extreme
Monitor Warnings	X	X	X
Patrols		X	X
Disable Reclosers		X	X
De-Energize Tier 3 FTZ Line			X

**SECTION 11- Community Support in Emergencies**

**A. Community Outreach**

Educating the community on what to expect during elevated weather conditions, and the subsequent response to those conditions that could impact the residents and businesses in Anaheim is a priority. Anaheim has held several community outreach events including a Wildland Fire Preparedness Fair in April 2019 and Public Safety Town-Hall meeting for District

6, an area primarily located in the FTZ, in July 2019 to inform the community of how APU and AF&R are preparing for wildfires and preventative measures taken as outlined in this WMP. Specific to PSPS, APU and AF&R held an on-site outreach event in October 2018 for the residents adjacent to the Tier 3 FTZ potentially impacted by a PSPS, informing them of the measures taken to avoid a power shut-off, but also preparing them with alert notifications, utility staff presence and contact information in the event one does occur. Residents were also informed of future plans to underground the power lines.

## **B. Emergency Response**

APU wildfire mitigation response procedures outline the protocol to ensure appropriate operational procedures up to and including PSPS protocol are implemented during extreme conditions and appropriate procedures are in place for notifying all stakeholders impacted when de-energizing and re-energizing electrical lines including customers, the Utility's Public Information Officer (PIO), AF&R Emergency Management and Preparedness, Anaheim Police Dispatch Center, APU Water Division and Customer Service Management, and external agencies associated with APU operational support.

One of the benefits of having a municipally owned electric and water utility is the close coordination with Anaheim's first responders, working collaboratively as emergencies such as wildfires arise. In case of emergencies including PSPS, APU has a supporting role with the AF&R in emergency protocols for public support services as delineated in the City of Anaheim Emergency Operations Plan (The link to view the City of Anaheim Emergency Operations Plan is: <http://www.anaheim.net/DocumentCenter/View/21657/City-of-Anaheim-EOP-2017>). These services include care, shelter-in-place, animal control, disability assistance, vehicle access, and functional needs. The preparations and response for a PSPS are included with those used for major events such as flooding and earthquakes. APU will follow the emergency protocols outlined in the City of Anaheim Emergency Operations Plan, where the City adheres to the policy summarized below. In addition, considerations for special needs populations are built into the responsibilities of each member of the Emergency Operations Center organization and are also addressed in supporting procedures and checklists:

- Disabled customers will be accommodated for access to services or facilities provided by Anaheim.
- Anaheim will work to accommodate special populations and those with disabilities to address their circumstances and needs.
- During emergency situations, Anaheim will make reasonable modifications to policies, practices, and procedures to assist residents with disabilities.
- Priority will be given to house special populations and those with disabilities to keep families, friends, and/or neighbors in close proximity when in mass care emergency shelters.
- Eligibility for mass care shelters will not be dependent on a personal care attendant.
- During preparedness and mitigation activities, Anaheim will conduct outreach activities to residents with special needs to ensure they are prepared in times of crisis.

Outlined in the City of Anaheim Emergency Response Plan - Public Notification and Alerts, methods of warning the public of specific emergency conditions are described below. These systems may also be primary ways that state and local governments become aware of emergency information. Public communications such as emergency information, warnings, and actions for an event will be broadcasted to the public by any one of the following methods:

- Emergency Alert System (EAS)
- Wireless Emergency Alert (WEA)
- Integrated Public Alert and Warning System (IPAWS)
- Route alerting - Detour and evacuation routes posted by AF&R
- AlertOC – Mass notification via phone or text message initiated by Orange County
- Anaheim Alert – Mass notification via phone or text message initiated by the City of Anaheim
- Social Media
- Media releases – through the City PIO
- Telephone emergency hotline – established during Canyon Fire 2

APU maintains a Public Utilities Department - Emergency Response Plan (ERP) specific to utility operations to ensure a safe, timely, effective, and well-organized response to major disruptions of services provided by APU including Electric, Water, Customer, and Finance services. This ERP incorporates knowledge gained from the experience of others and includes industry best practices developed as a result of major regional storms and outages affecting other organizations over the last several years. Also included is information obtained from the California Utilities Emergency Association and the American Public Power Association, as well as standards contained in the CPUC's GO166-Standards for Operation, Reliability, and Safety During Emergencies and Disasters, which APU has utilized as a guideline for emergency planning.

### **C. Community Support**

When needed, a Mobile Neighborhood Utility Center will be established in close proximity to areas impacted by major water or electric incidents to provide timely and meaningful system status to customers as well as to provide real-time customer feedback to utility staff.

The Neighborhood Utility Center is deployed to specific service areas for which the estimated restoration time is anticipated to be more than 24 hours. The precipitating event may be equipment failure, earthquakes, floods, storms, fire, or any combination of these events. It may also be coincident with a local or state-wide emergencies not directly associated with APU but which may impact Anaheim's water and energy resources. Activation may also be preemptive.

The Neighborhood Utility Center(s) will be located at strategic public gathering areas based upon the type of emergency event and may be relocated or closed as conditions and priorities change.

The priorities of the Neighborhood Utility Center are to:

1. Gather electric and/or water system information and intelligence relative to an incident or outage.

2. Provide timely information to the APU and City Emergency Operations Center- Utility Branch.
3. Provide restoration timelines to public in coordination with APU and City PIO, and help to reduce call volume to the call center by dealing directly with the public
4. Provide personalized attention to members of the public who may need special assistance that is not of an emergency nature
5. Maintain system and resource status awareness
6. Provide mobile back-up power generation to designated Community Centers

The Neighborhood Utility Center is facilitated by one or more Neighborhood Utility Liaisons (Liaisons). The Liaison assignment is typically filled by members of APU staff that are not performing duties respective to emergency operations centers or in direct support of water or electric system restoration. The Liaison(s) are responsible for collecting, assessing, evaluating, and disseminating information pertaining to the incident. They directly interface with the public throughout the incident and continue to maintain contact with the public until substantial recovery is achieved.

#### **D. Post-Event Restoration and Response**

Post event customer support and protections are in place to facilitate recovery from the damages incurred and provide multiple options for billing adjustments, extended. Anaheim City Council approved a rule modification that upon declared emergencies, APU may waive certain charges or portions related to a) Customer service charges, b) Temporary Service, c) service connection plan checks, design/engineering, and inspection, and/or d) related administrative charges related to both electric and water services. Such fees were waived during Canyon Fire 2 to customers with damaged properties.

The associated fees for the abandonment of existing service connections, installation of new service connections and meters, and inspection of new backflow prevention assemblies are considered Service Connection Fees. Depending on the extent of damages and new construction at each property, Service Connection Fees will vary. For minor service improvements a Service Connection Fee would not be applicable; however, for a structure requiring a complete rebuild and a fire sprinkler system, Service Connection Fees could be significant. Waived charges apply to the existing property owner for one year from the date the emergency or local emergency is proclaimed or declared, unless the Anaheim City Council declares otherwise.

As part of the Canyon Fire 2 restoration response, electric service to the residence was confirmed by patrols, if service was disrupted, home circuit breakers and wires were inspected and if damaged, APU coordinated with contractor crews to make repairs to fully restore service to those customers impacted. APU also assists customers with damaged homes who seek to keep their landscaping alive during the rebuilding process. Irrigation controllers were provided at no charge during Canyon Fire 2 upon confirmation that water service can be safely restored, allowing customers to avoid having to replace their existing landscaping that was not damaged from the fire.

## **SECTION 12- Workforce Training**

Emergency Response training is conducted annually to prepare for multiple types of natural disasters that require activation of the City Emergency Operations Center (EOC) and the APU Electric Department Operations Center (DOC). Specific wildfire emergency training scenarios will be conducted annually, either as part of the larger Department-wide training or through table-top exercises with key personnel responsible for electric operations.

Training for operation of the fire cameras by the AF&R Dispatchers is conducted using a train-the-trainer method. In July 2019, representatives from UCSD-Scripps and SCE, along with supervisory personnel from AF&R conducted fire camera training. This training will be held annually as a refresher and for new personnel in the division.

As previously mentioned in Section 10(a) - System Patrols, the AF&R CERTS are utilized in the field during elevated fire conditions to provide additional visibility of electrical infrastructure and report back to APU System Operations. APU conducts an annual training with the AF&R CERTS as part of a larger AF&R safety training, to review the elements of electrical infrastructure including the pole tag numbers, switches, conductors and connections, transformers, and other equipment so they can prioritize the anomalies to look for, and what equipment identification is helpful for APU operators to pinpoint the location of the anomaly and make appropriate operational decisions based on that information.

This “in the field” approach is also used to inform APU Operations whether to restrict work practices that may lead to fire ignition. Tools and vehicles can be a source of sparks or ignition, for example from driving a truck over dry brush or using hot-tools such as hydraulic assisted cutting tools, grinding tools or welders. Non-essential maintenance work in the FTZ is deferred during a RFW and extreme SAWTI, however, for essential work to make repairs, APU Operations will inform AF&R if standby watch is required. All utility trucks are equipped with fire suppression equipment and annual training on their use is provided by AF&R.

## **SECTION 13- Organization and Assignment Responsibilities**

This section describes the roles and responsibilities required to accomplish the objectives of this WMP. Various stakeholders play a role in the preventative and operational mitigation strategies, emergency response and communications. An organizational chart in Figure 9 below gives context to the organizational structure of the City of Anaheim and from there, specific groups responsible for implementing the measures and programs within the WMP.

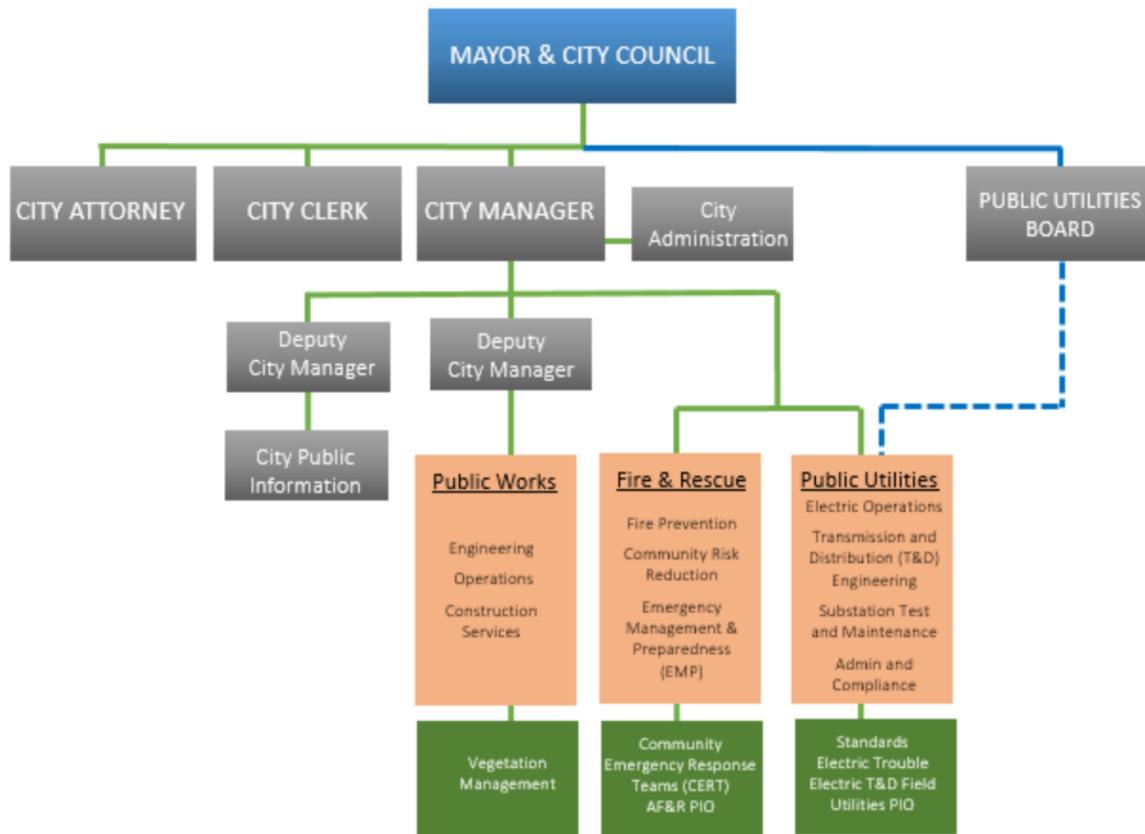


Figure 9. City of Anaheim Organizational Structure

The following Table 8 identifies the roles and responsibilities of City of Anaheim stakeholders.

Table 8. Roles and Responsibilities for Implementation of the WMP

Advisory Warning Watch and Notification	AF&R EMP/APU Operations
Fire Threat area assessment	AF&R Fire Prevention/APU Operations
Fire Monitoring Cameras and Weather Stations	APU Operations/ AF&R Fire Prevention
On-Site Visual Inspections during RFW and SAWTI events	APU Electric Trouble/AF&R CERTS
Disabled Reclosers Procedure	APU Operations
Infrastructure Integrity Assessment	APU Electric Trouble/T&D Engineering
Construction Standards	APU T&D Engineering
Vegetation Management	APU Electric T&D Field/Public Works
Equipment Evaluation and Replacement	APU Standards/Electric Operations
Distribution System Inspection	APU Standards/T&D Engineering
Substation Inspection/Maintenance	APU Substation Test and Maintenance
Reporting	APU Administration and Compliance
WMP Review and Approval	Public Utilities Board/City Council

## **SECTION 14- Metrics, Monitoring and Reporting**

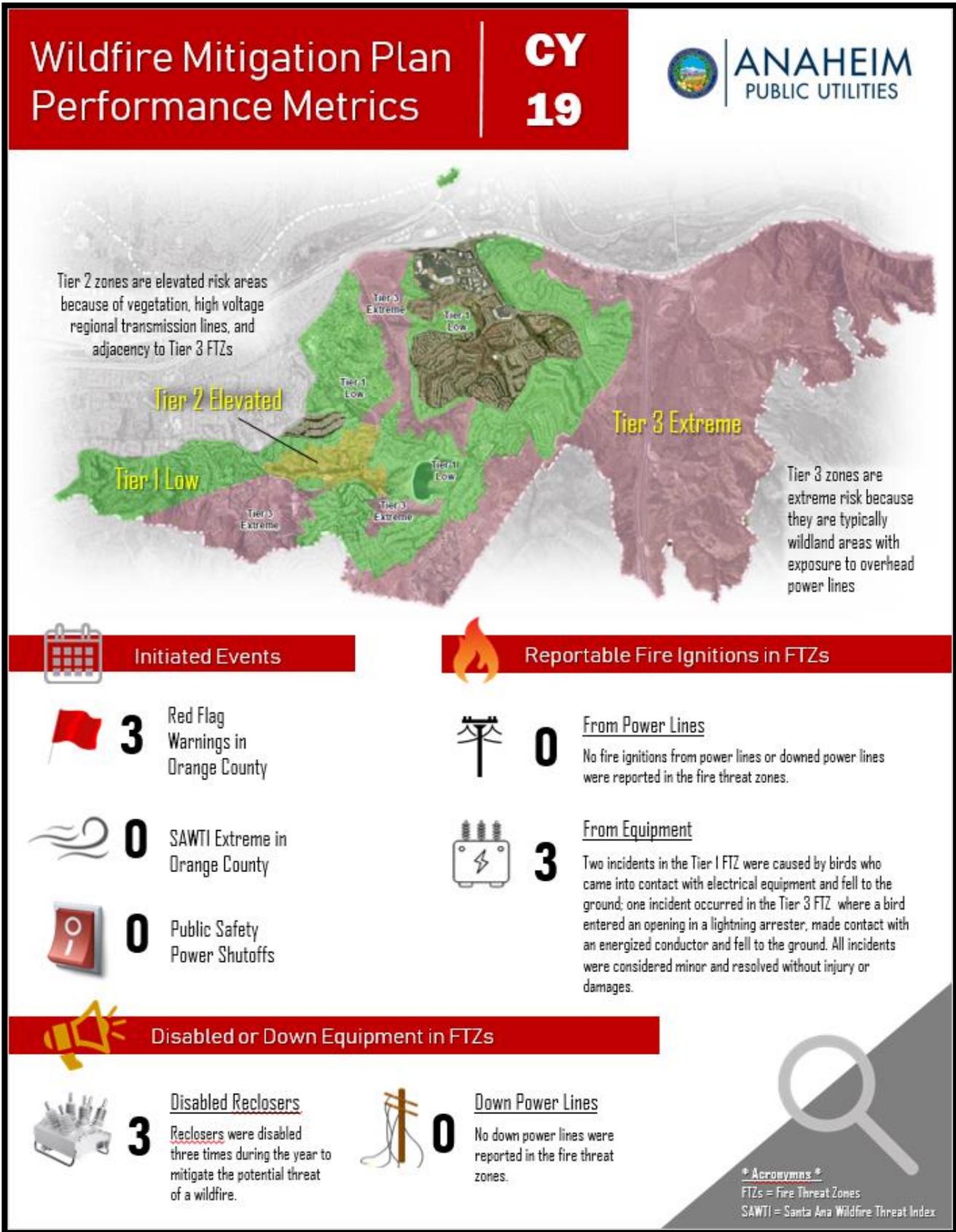
Metrics are used to evaluate the WMP's performance consistent with GO 95 and GO 165 requirements, and utilizing the guidelines suggested in SB 901 and 1028. There are two categories of metrics, 1) specific metrics of fire incidents and 2) the WMP's performance metrics. As industry risk metric standards continue to develop, APU will identify additional metrics to measure the reduction of wildfire risk in future WMPs. Incident metrics include RFW and elevated SAWTI initiated in the Orange County area, reclosers functions disabled in the FTZ as a result of elevated fire and wind conditions, PSPS events initiated, and reportable ignitions in a FTZ associated with electric overhead conductors. These metrics are used to track progression and to measure the effectiveness of these preventative and operational mitigation strategies to further strengthen fire preparedness and safety.

Other scenarios exist where power lines have the potential to cause fire ignition, for example a vehicle hitting a power pole or power lines in contact with each other during a high wind storm. A reportable ignition associated with electric overhead power-lines in APU's Tier 2 and Tier 3 FTZ is the number of power-lines involved in fire incidents annually that occurred within APU's Tier "2 or 3" FTZ. Generally, a reportable ignition includes all of the following: a) Ignition is associated with APU's power-lines, b) something other than APU's facilities burned, and c) the resulting fire traveled more than one meter from the ignition point.

Performance metrics tracking progress in preventative strategies and programs include a target goal to establish the benchmark comparison to actual completion. Sample Performance metrics include vegetation clearance, inspections completed, and training performed which are used to inform the performance of each preventive strategy and program.

Performance metrics were first introduced within the APU 2018 WMP and at that time relatively limited data was available to form comparisons. New metrics have been included in the 2020 WMP where there may not have been a metric input applicable in the 2018 year. The following Figure 10 is a summary of incident and performance metrics associated with the APU WMP.

Figure 10. WMP Incident and Performance Metrics



# Wildfire Mitigation Plan Performance Metrics

# CY 19



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## New Weather Monitoring Station in FTZs

**0** There are currently Four weather stations with temp, wind, and humidity level data accessible to APU Operations and AFGR Dispatch. APU's goal is to install 6 more in the next two years for a total of 10 stations.



## Asset Replacements

**27**

### Wood to Ductile Iron Poles

APU met its annual goal of replacing 24 wood poles in the Tier 3 FTZ with fire-resilient, ductile iron poles.

**6**

### Concealed Lighting Arresters

To prevent animal intrusion into energized equipment, the goal is to replace 49 of non-enclosed lighting arresters in the FTZs with fully enclosed units.

**6**

### Non-Expulsive Fuse Devices

Use of current-limiting fuses with self-contained design that eliminate expulsive showers when operating. The goal is to replace 31 location within the FTZ after conclusion of initial pilot program.



## % of Power Lines Underground in FTZs

**98%**

Approximately 1.06 circuit miles of overhead distribution power lines are in a Tier 3 FTZ, and over 60 % of these power lines are de-energized under normal conditions, while the remaining 40% traverses through a residential area.

APU is currently working on undergrounding approximately 0.5 circuit miles of overhead line in the Tier 3 FTZ. The project is in design and construction expected to commence in summer 2020 with expected completion prior to the beginning of the 2021 fire season.

**2**

## New Fire Cameras Installed in FTZs

APU installed two robust cameras with near-infrared capability, view and control access, and linked to Alertwildfire.org and networked to AFGR Dispatch and APU Operations. APU's goal is to install 4 more cameras in the next 2 years for a total of 6 cameras.



## Annual Trainings



### Fire Camera View & Operations

Training was held for AFGR Dispatch Center staff and APU Operators on accessing the fire monitoring cameras from the emergency dispatch centers.



### De-energize/Restore Procedures

Training was provided on triggers to initiate de-energization of circuits within the FTZs and executing the wildfire mitigation response procedures



### Disabling Reclosers

Training was conducted on triggers to initiate disabling of reclosing operations on circuits within the FTZs and executing the wildfire mitigation response procedures

#### \* Acronyms \*

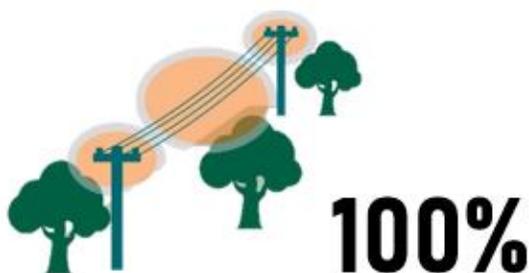
FTZs = Fire Threat Zones  
APU = Anaheim Public Utilities  
AFGR = Anaheim Fire & Rescue

# Wildfire Mitigation Plan Performance Metrics

**CY  
19**



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## % of Tier 3 FTZ Power Lines Cleared of Vegetation

All 1.06 miles of power lines along the Tier 3 FTZ were cleared of vegetation prior to the onset of fire season, meeting APU's annual goal, and reducing the risk of fire ignition and propagation from electric infrastructure.



## Utilizing Goats for Fire Prevention

Anaheim Fire & Rescue employs herds of goats to eat dry bush and invasive plants – especially in difficult topographical areas with steep hills and valleys. Invasive (or alien) plants are considered dangerous because they tend to catch on fire more easily than native-born plants from the area.



## Inspections & Patrols



### Overhead Distribution Lines

All overhead distribution lines were patrolled within the compliance period set in GO 95/165\*, meeting the annual goal for this metric.



### Underground Distribution Lines

Detailed line inspections were completed on all overhead and underground lines within the compliance period set in GO 95/165\*



### Substation & Yard Equipment

Monthly visual inspections of all substation and yard equipment were completed, meeting or exceeding GO 174\* standards.



## Sampling & Testing



### Strength of Wood Poles

Testing of wood poles in the fire threat zones were completed, in accordance with GO 95/165\* standards, to measure the integrity of the wood pole.



### Contaminants within Insulating Oil

Oil from all substation equipment residing in the fire threat zones were sampled for contaminants, as such contaminants could lead to premature equipment failure.

*GO 95 = General Order 95 are rules established by the California Public Utilities Commission (CPUC) for overhead line design, construction, and maintenance; such rules are intended for adequate service and safety for those engaged in construction, maintenance, operation, or use of such overhead lines.*

*GO 165 = General Order 165 are requirements established by the California Public Utilities Commission (CPUC) for electric distribution and transmission facilities regarding inspections to ensure safe and high-quality electrical service.*

*GO 174 = General Order 174 are uniform requirements from the State of California on substation inspection programs, intended to promote safety and service adequacy.*

Metrics that were added or updated from the APU 2018 WMP were the result of actual events that occurred and therefore informed this 2019 WMP. As the Incident metrics indicate, there were two incidents where contact by from a foreign object on energized overhead parts occurred and ignited the brush at the base of the pole and was quickly extinguished by first responders. These two incidents resulted in evaluation of all lighting arresters and mounting brackets within the FTZ, and a program established to replace the equipment and install insulated wrap to prevent future occurrences. The installation of the fire cameras in Anaheim to enhance situational awareness also requires ongoing training for fire agencies authorized to operate those cameras. This training has been included in the operational strategies to reduce wildfires and therefore a metric to track the performance of training has been added. Each incident is tracked and investigated and reviewed again when updating future APU WMPs.

Tracking these metrics will provide insight into the effectiveness of APU wildfire mitigation measures and assist in formulating enhanced measures in future WMPs if warranted.

## **SECTION 15- Monitor and Auditing**

The WMP will be reviewed annually. This annual review will align with the planning and budgeting process. The review will include an assessment of the WMP programs and performance combined with analysis of performance metrics to develop changes to design, construction, or maintenance standards and practices to inform activities for future WMPs.

APU will continuously monitor the implementation of the WMP to identify any deficiencies in the wildfire mitigation plan or its implementation. Any identified deficiencies, will be assessed and corrected as soon as is practicable. A monitoring and tracking process would entail tracking the metrics, feedback, any identified increased risk throughout the year and ensuring that the WMP adequately addresses them.

APU will monitor and audit the effectiveness of its electrical line and equipment inspections, including inspections performed by contractors described in Section 9.A through its implementation of GIS, its tracking of metrics described in Section 14, and by other means (such as spot checks or reviews of work orders) on an ongoing basis.

A qualified independent evaluator is required by AB 1054 to assess and audit the comprehensiveness of the WMP prior to consideration for recommendation by the Public Utilities Board for approval by the Anaheim City Council. In March 2020, Guidehouse, Inc. was retained by APU to perform the independent audit following a competitive solicitation that followed Anaheim's Council Policy 4.1 – Selection of Professional Consultants.

On or before July 1<sup>st</sup> of each year, APU will submit the WMP to the California Wildfire Safety Advisory Board (CWSAB). The CWSAB will review and provide comments and advisory opinions regarding the content and sufficiency of the WMP. APU will consider comments and opinions received by the CWSAB in future WMPs.