Anaheim Public Utilities
Wildfire Mitigation Plan
# TABLE OF CONTENTS

SECTION 1- Plan Overview and Objectives ........................................................................ 2

SECTION 2- Assessment of High Fire Threat in APU Electric Service Territory .......... 3

SECTION 3- Asset Inventory in High Fire Threat Zones .................................................. 4

SECTION 4- Situational Awareness ................................................................................. 5

SECTION 5- Preventative Strategies to Build Resiliency .................................................. 5
  A. Vegetation Management ......................................................................................... 6
  B. System Inspection and Maintenance .................................................................... 5
  C. Construction Standards ....................................................................................... 7
  D. Pole Loading and Wire Spacing .......................................................................... 7

SECTION 6- Operational Strategies to Reduce Risk of Fire Ignition ................................. 7
  A. System Patrols ...................................................................................................... 8
  B. Reclosers ............................................................................................................ 8
  C. De-Energize Power Lines .................................................................................... 8
  D. Summary of Operational Strategies .................................................................... 9

SECTION 7- Workforce Training ..................................................................................... 9

SECTION 8- Organization and Assignment Responsibilities ............................................. 9

SECTION 9- Metrics and Reporting .............................................................................. 10

EXHIBIT A- Anaheim Fire Map .................................................................................... 11
SECTION 1- Plan Overview and Objectives

The Wildfire Mitigation Plan (Plan) serves to establish methods and procedures used to construct, maintain, and operate the City of Anaheim Public Utilities (APU) electrical lines and equipment in a manner that will minimize the risk of catastrophic 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 high Fire Threat Zones (FTZ) within the City of Anaheim (Anaheim) service territory. It is important to note that approximately 98% of APU-owned power lines in the FTZ are currently underground, which significantly reduces the overall risk to the community.

The Plan 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. Additionally, this Plan includes emergency shut-off plans to de-energize lines if at risk of falling down in high winds or other natural events. The following is a summary of components included in the Plan:

1) Objectives of the Plan;
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 Plan 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 Plan;
8) Monitoring and audit provisions that support implementation of the Plan, and identifying any deficiencies or areas for improvement; and
9) Ongoing monitoring and audit of the effectiveness of electrical line and equipment inspections.

The Plan uses the statewide adopted fire threat map developed by public and private utility agencies and corporations including APU, with oversight by the California Department of Forestry and Fire Prevention (Cal-Fire) and the California Public Utilities Commission (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.

To implement the Plan, a matrix identifying persons responsible for executing the Plan, 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 8. Finally, metrics using historical and incident driven data measure the effectiveness of the mitigation efforts and drive future enhancements.

This Plan is the roadmap to achieve a level of hardening of the electric infrastructure consistent with tiered FTZs. Review of this Plan is recommended on a three year 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.

SECTION 2- 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 to prioritize the need to increase infrastructure resiliency to mitigate the wildfire threat posed by electric infrastructure. APU and the Anaheim Fire Department, with outreach to Southern California Edison and the Orange County Fire Authority developed the Anaheim FTZ boundaries, Exhibit A Anaheim Public Utilities Fire Threat Map, which was reviewed by the PDP and adopted by the IRT in September 2017. There are three tiered fire threat zones in Anaheim:

<table>
<thead>
<tr>
<th>Zone</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 3</td>
<td>Extreme</td>
<td>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.</td>
</tr>
<tr>
<td>Tier 2</td>
<td>Elevated</td>
<td>Elevated risk due to the vegetation, high voltage regional transmission lines crossing the area, and adjacency to Tier 3 FTZs.</td>
</tr>
<tr>
<td>Tier 1</td>
<td>Low</td>
<td>Well developed areas, typically with underground high voltage circuitry.</td>
</tr>
</tbody>
</table>

Within Anaheim’s boundaries there are four Tier 3 FTZs; these areas are exposed, generally steep north facing slopes with Coastal sage scrub and mixed chaparral. Areas designated Tier 3 contain two sections of pole line totaling approximately one mile, which is a small portion of overhead 12,000 volt pole lines traversing the terrain which warrants the need for increased infrastructure resiliency to reduce fire risk.

One section is an overhead 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 has been reinforced for increased resiliency. Additionally, this segment of line does not serve customers and is therefore a candidate to be de-energized if fire conditions exceed thresholds.

The second segment of overhead 12,000 volt line traverses a Tier 1 FTZ and a portion of the line crosses into a Tier 3 FTZ. The Plan recommendation is to seek approval to underground this segment of overhead line as part of the Underground Conversion Program’s 5-year planning process, and in the interim, apply the preventative and operation strategies outlined in this Plan to mitigate fire risk.

A small segment of 12 kV overhead line traverses the edge of an area designated Tier 2 FTZ and adjacent to the lower Tier 1 FTZ. Vegetation clearance is currently maintained following the vegetation management practices (see Section 5), and due to the moderate risk associated with Tier 2 FTZ, the line will be patrolled annually to ensure those clearances are maintained.

Also located within the Tier 1-3 FTZ are Southern California Edison’s (SCE) high voltage overhead 500,000 volt transmission lines which serves as one of several interconnection paths for the City of 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 that 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, and APU has redundancy with two substations that are each capable of serving the City.

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 personnel.

SECTION 3- Asset Inventory in High Fire Threat Zones (FTZ)

Overhead electrical infrastructure located within or adjacent to the Tier 3 FTZs are listed in the table below. 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>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
<th>Quantity</th>
<th>Customers Impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical</td>
<td>12kV pole line</td>
<td>1.02 miles, 41 poles, 19 overhead transformers</td>
<td>12</td>
</tr>
<tr>
<td>Electrical</td>
<td>Surface-mounted transformers serving water pumps adjacent to Tier 3 FTZ</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Water</td>
<td>Water pump adjacent to Tier 3 FTZ</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Communications</td>
<td>Cell tower</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
SECTION 4 - 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 lighting conditions. APU collaborates with multiple stakeholders including, but not limited to, Anaheim Fire and Rescue (AF&R), the APU Water Division, the National Weather Service, and adjacent electric utilities including SCE and San Diego Gas and Electric 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 CalFire, UCLA, the National Forest Services, the National Weather Service, San Diego Gas and Electric, 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. The High Performance Wireless Research and Education Network (HPWREN) is a public access network of high resolution cameras used by fire agencies as a topographical visual tool for scouting fires. The Santiago Peak HPWREN linked camera is monitored by the AF&R and is available as another real-time data source for monitoring fire threat conditions. These indicators are used to monitor and where appropriate, warrant operational actions which are discussed in this Plan.

SECTION 5- Preventative Strategies for Building Infrastructure Resiliency

The goal of the Plan 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, recommend 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 (GO). GO’s 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 following 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 annually. 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 Fire-Threat Map which is consistent with the Anaheim Fire and Rescue adopted CAL-FIRE map.

B. System Inspection and Maintenance

APU conducts routine inspections of distribution equipment to assess condition and prioritize maintenance or replacement. The prioritization method follows industry practice, which aligns with CPUC guidelines as delineated in GO 165 – Inspection Requirements for Electric Distribution and Transmission Facilities. A visual inspection of over 8,700 underground substructures and above surface equipment was completed 2017. Inspection of the overhead system, which includes over 17,000 poles, associated overhead conductors and equipment is currently underway, and expected to be complete by end of calendar year 2018. Underground distribution equipment is on a 3-year inspection cycle. Surface-mounted and overhead equipment is inspected on a 5-year cycle, consistent with GO 165 guidelines.

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.

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 station currently located at the Orange
County Water District facility in east Anaheim, with future plans to construct another weather
station at APU-owned Lenain Water Treatment Plant 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 have been
modified to incorporate design and construction to sustain that highest measured 3-second wind
gust in the higher FTZ. For example, 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.

D. Pole Loading and Wire Spacing

APU is primarily the owner of the poles throughout Anaheim, and is a participant in the
Southern California Joint Pole Committee that allows members to mutually allocate space on the
pole between 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.

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

SECTION 6- 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 to 95
degrees and above 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

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

Annual patrols of applicable utility equipment and structures in urban areas are conducted by APU. Patrols may 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. 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. Should the severity of fire threat conditions dictate, APU will coordinate with AF&R to utilize the Community Emergency Response Teams (CERTS) already out on patrols for multiple purposes to provide additional visibility on electric infrastructure.

B. Circuit Reclosers

Microprocessor units called 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, Utility operators will disable the automatic reclosing capability of the protective relays for lines located within the Tier 3 FTZ as a precautionary measure, consistent with industry practices in California.

C. De-Energize Power Lines

The Utility operates an electric system of interconnected circuits to provide redundancy and flexibility to re-route power during outages and emergencies. This flexibility allows for an overhead power line to be de-energized, with minimal power disruption to customers. Under a RFW event, the Utility will de-energize pole lines that pose a potential threat within Tier 3 FTZ, and will endeavor to re-route power utilizing power lines in adjacent lower threat areas in order to minimize inconvenience to customers.

This is an added precaution to minimize risk of contact with energized lines. AF&R will be notified when power lines in the Tier 3 FTZ have been de-energized which adds an additional element of safety for their fire-crews working in the area. Customers affected by de-energized lines will be contacted in person or by phone 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.
At times it is necessary to shut off power to residents and businesses in order for fire crews to fight a structure fire. This is done in three ways: 1) the AF&R will open the main breaker at the breaker panel which de-energizes the structure; 2) APU Troubleshooters will disconnect power at the closest accessible point whether at an adjacent power pole, a surface-mounted transformer, or switch enclosure; or 3) the APU System Operator will operate a switch remotely to de-energize an area. This coordination between APU and AF&R occurs whether or not there is an elevated risk of fire since this is a safety precaution for AF&R fire crews when fighting any fire where structures are at risk.

D. Summary of Operational Strategies

Below is a summary of operational strategies to be implemented during elevated weather conditions:

<table>
<thead>
<tr>
<th>Operating Strategies</th>
<th>Elevated Temperatures Above 95°F</th>
<th>Red Flag Warning (RFW)</th>
<th>Santa Ana Wind Threat Index (SAWTI) Extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor Warnings</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PatROLS</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Disable Reclosers</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>De-Energize Tier 3 FTZ Lines</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

SECTION 7- 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.

SECTION 8- Organization and Assignment Responsibilities

<table>
<thead>
<tr>
<th>Advisory Warning Watch and Notification</th>
<th>AF&amp;R/APU Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching Procedure Implementation</td>
<td>APU Operators</td>
</tr>
<tr>
<td>Infrastructure Assessment</td>
<td>APU Troubleshooters/Engineering</td>
</tr>
<tr>
<td>Construction Standards</td>
<td>APU Engineering</td>
</tr>
<tr>
<td>Vegetation Management</td>
<td>APU T&amp;D Field/Public Works</td>
</tr>
<tr>
<td>Reporting</td>
<td>APU Administration and Compliance</td>
</tr>
<tr>
<td>Plan Review and Approval</td>
<td>Public Utilities Board/City Council</td>
</tr>
</tbody>
</table>
SECTION 9- Metrics and Reporting

Metrics are used to evaluate the Plan’s performance consistent with GO 95 and GO 165 requirements, and utilizing the guidelines suggested in SB 1028. Sample metrics include reportable ignitions in a FTZ associated with electric overhead conductors, de-energized lines in Tier 3 FTZ, vegetation clearance and inspections completed and training performed. Because approximately 98% of APU-owned power lines in the FTZ are currently underground, this Plan will be updated every three years to coincide with inspection cycles. Metrics will be updated annually and included in the annual Reliability Report presented to the City of Anaheim Public Utilities Board.