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Subject: Independent Evaluator's Report of the Transmission Agency of Northern California 2023 Wildfire Mitigation Plan for the California-Oregon Transmission Project

1 Introduction

The Transmission Agency of Northern California (TANC) contracted with Dudek to engage in an independent evaluation of its 2023 Wildfire Mitigation Plan (WMP) for the California-Oregon Transmission Project (COTP). This independent evaluation report describes the technical review and evaluation of the WMP prepared for TANC. The WMP requirements are codified in California Public Utilities Code (PUC) Section 8387(b)(2) for local publicly owned electric utilities (POUs). PUC Section 8387(c) requires that an independent evaluator review and assess the comprehensiveness of a POU's WMP and issue a summary report. The year 2023 is important for POUs because they are required by PUC Section 8387(b)(1) to comprehensively revise their WMPs "at least once every three years."

Dudek conducted a review of TANC's 2023 WMP from March 13 to April 19, 2023. The focus of the evaluation was to determine the comprehensiveness of WMP and ensure it included all elements required under PUC Section 8387(b)(2).

In addition to evaluating the elements required by the PUC, Dudek reviewed the Wildfire Safety Advisory Board's (WSAB's) specific guidance for TANC as published in their Guidance Advisory Opinion for the 2023 Wildfire Mitigation Plans of Electric Publicly Owned Utilities and Rural Electrical Cooperatives (WSAB 2022).

This Independent Evaluator's report contains the following elements: (1) an overview of the COTP, (2) A review of the statutory requirements in PUC Section 8387(b)(2) for local POUs, (3) A review of the specific recommendations published by the WSAB for the TANC 2022 WMP, (4) 2022 wildfire mitigation and prevention accomplishments by TANC, (5) an overview of the metrics used in TANC's WMP, and (6) a comparison of wildfire risk reduction strategies used by TANC with those applicable under relevant electric utility industry standards.

2 An Overview of the California Oregon Transmission Project

The COTP covers a unique service territory compared to the other POU's that are required to annually prepare a Wildfire Mitigation Plan. The COTP is a bulk energy transmission project that extends from the California-Oregon border to Tracy, California. The TANC's service territory consists of the 340-mile-long corridor that contains the

transmission lines plus two substations, a voltage compensation station, and microwave communication facilities. Beginning at the COTP's northern extent, the transmission line corridor crosses through the northeastern plateaus' region mainly through arid basins and uplands covered with a mixture herbaceous plants and grasses, sagebrush, and scattered juniper woodlands (van Wagtendonk, 2018). East of Mount Shasta the COTP follows the increasing elevation of the terrain out of the northeastern plateau and into the southern Cascades region. Vegetation in this region transitions as elevation increases from the juniper woodlands found on the uplands of the plateau to mixed juniper-pine conifer forests to Ponderosa Pine forests and mixed conifer forests at the highest elevations of the COTP in this region (van Wagtendonk, 2018). Overall fuel loads around the COTP increase as the elevation increases. The COTP descends to the Redding area as it continues south from the mountains around Mount Shasta. Vegetation transitions again as the terrain crossed by the COTP descends towards the central valley. Conifer forests at higher elevations transition to mixed conifer and hardwood forests then to oak woodlands and grasslands as the COTP reaches its lowest elevations in the Redding area and enters the Olinda Substation. From the northern most extent of the COTP to the Olinda substation, the COTP passes through predominantly undeveloped lands covered with natural vegetation. Only near the Redding area does the COTP pass through sparsely developed lands and agricultural lands. South of Olinda the COTP continues through Oak woodlands and grasslands until the Red Bluff area where the COTP descends to the floor of the Central Valley. From Red Bluff to the COTPs southernmost extent in Tracy the transmission corridor remains in the Central Valley. Vegetation in this area transitions from open oak woodlands near Red Bluff to predominantly herbaceous plant and grass dominant vegetation as the COTP extends to the south. Agricultural lands become increasingly common south of Red Bluff and south Orland the COTP is primarily passing through or adjacent to agricultural lands. The Olinda and Tracy/Tesla substations are located on relatively flat areas surrounded by a mix of grasslands and open woodlands. The Maxwell compensation station is in an agricultural area.

Approximately 36% of the COTP's transmission corridor is on lands classified by the CPUC High Fire Threat District Map (California Public Utility Commission, 2018) CPUC elevated or extreme risk, primarily the portion of the COTP north of the Redding area that extends through mountainous areas around Mount Shasta. Approximately 6% of COTP's transmission corridor is classified as Wildland Urban Interface (WUI) since the COTP does not serve a specific city or urban area. It largely passes through undeveloped areas with exception of the portion around Redding (University of Wisconsin, SILVIIS Lab, 2021).

The TANC's large service territory and varying climatic conditions along the COTP corridor results in a fire season that varies in length based on elevation and weather. During a typical year the general fire season is the longest for the portions of the COTP at lower elevations in the central valley and shorter for the portions that extend through the mountains around Mount Shasta. However, the entire length of the COTP experiences a long warm and dry period during the summer that results in peak wildfire conditions in September and October. During exceptionally dry years, the fire season will be year-round in the lower elevations.

3 Statutory Requirements for Wildfire Mitigation Plans

PUC Section 8387(b)(2) lists the statutory requirements for WMPs. These are the specific elements that the independent evaluator must review to make its determination for this report. The specific elements that must be addressed in TANC's WMP are summarized here for reference.

- Staff responsibilities

- General objectives
- Wildfire risk reduction program descriptions
- The metrics used to evaluate the WMP's performance.
- How the application of previously identified metrics has informed the WMP.
- Protocols for reclosers, de-energization, and public safety power shut-off
- Procedures for community notification and outreach
- Vegetation management plans
- Electrical equipment and infrastructure inspection plans
- Description of wildfire risks and drivers for those risks throughout the service territory, including design, construction, operation, and maintenance of equipment and facilities and topographic and climatological risk factors
- Identification of any geographic area in the service territory that is a higher wildfire threat than is identified in a commission fire threat map.
- Identification of enterprise-wide safety risk and wildfire-related risks
- How the service will be restored after a wildfire
- The processes and procedures used to monitor and audit the implementation of the WMP and identify any deficiencies, and the effectiveness of electrical line and equipment inspections.

4 Public Utility Code Requirements

Dudek found that TANC's WMP meets the statutory requirements of comprehensiveness per PUC Section 8387. The review of the WMP's elements is summarized relative to the application of the WMP. Dudek's assessment is in **bold text** beneath the description of the requirement.

Minimizing Wildfire Risks

PUC Section 8387(a) requires the following: "Each local publicly owned electric utility and electrical cooperative shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of wildfire posed by those electrical lines and equipment."

The TANC COTP WMP and the documents referenced in the WMP comprehensively describe the safety-related measures that TANC follows to reduce the risk of its electrical equipment causing a wildfire. Dudek has determined that TANC complies with this requirement through the design of its system, its operations, maintenance, and the implementation of wildfire risk reduction and wildfire response strategies.

Evaluation of WMP Elements

Below is a summary of the WMP elements as required by PUC Section 8387, including restating sections of the WMP where applicable.

8387(b)(2)(A): Responsibilities of Persons Responsible for Executing the Plan.

Part III of the TANC WMP describes staff responsibilities and functions in the implementation of their WMP. Some elements of the implementation of WMP such vegetation management and inspections are shared between TANC and WAPA staff.

8387(b)(2)(B): Objectives of the Wildfire Mitigation Plan

Part I section C of the TANC WMP comprehensively describes the utility's WMP five objectives.

8387(b)(2)(C): Prevention Strategies and Programs

Part V in the TANC WMP describes the utility's wildfire prevention strategies. TANC relies on inspections, access road maintenance, and vegetation management to reduce wildfire risk from its equipment. Equipment hardening and undergrounding are not relevant to TANC COTP equipment.

8387(b)(2)(D): Metrics and Assumptions for Measuring WMP Performance

Part VII section B comprehensively describes the 11 metrics used by TANC to evaluate the effectiveness of the WMP for the COTP. Two of the metrics are external factor metrics, seven outcome metrics, and two performance metrics.

8387(b)(2)(E): Impact of Previous Metrics on WMP

Part VII section B describes how TANC has used the metric data collected from previous versions of the WMP have informed wildfire prevention activities within the COTP service territory. Tracking risk-related metrics is a requirement of National Electrical Reliability Corporation (NERC) standards. The TANC has been using data collected from vegetation and equipment inspections to inform risk-reduction activities. Table VII-2 contains a column that connects each metric to the wildfire prevention program that addresses the risk the metric is tracking.

8387(b)(2)(F): Reclosing Protocols

Part VI section B describes TANC's recloser protocols for the disabling/enabling automatic reclosers on the COTP. It includes the criteria TANC uses for determining recloser schemes.

8387(b)(2)(G): De-energization Notification Procedures

Part VI Section F of the TANC WMP summarizes the TANC's notification procedures during a de-energization event. TANCs notification procedures differ from most POU's in that the COTP does not have traditional 'customers' and instead serves other POUs. The TANC and WAPA have Standard Operating Procedures (SOPs) documenting the procedures for notifying impacted utilities of a de-energization event. The SOPs are confidential and are not included with the WMP.

8387(b)(2)(H): Vegetation Management

Part V section C of the TANC WMP comprehensively describes the utility's vegetation management program. This section describes vegetation management activities within the COTP ROW, outside the

ROW, and along the access roads to the ROW or TANC COTP facilities. Appendix A item 12 contains a detailed description of the vegetation management activities the TANC performs along the COTP.

8387(b)(2)(I): Inspections

Part V section C of the TANC WMP comprehensively describes the utility's inspection program. Inspection program descriptions are organized by the the type of equipment and how frequently the inspections are performed. Additional inspection detail is provided in Part VII in the discussion how TANC monitors and audits inspections.

8387(b)(2)(J)(i): Risks and Risk Drivers Associated with Design and Construction Standards

Part IV Section B part a. in the TANC WMP identifies the wildfire risk drivers along the COTP associated with design, construction, operation, and maintenance. The risk drivers identified are collected in two locations i.) Equipment, Structure, and Facility Features and iv.) Wire to Wire Contacts.

8387(b)(2)(J)(ii): Risks and Risk Drivers Associated with Topographic and Climatological Risk Factors

Part IV Section B part a. in the TANC WMP identifies the wildfire risk drivers along the COTP associated with topographic and climatological risk factors.

8387(b (2)) (K): Geographical Area of Higher Wildfire Threat

Part II Section D in the TANC WMP describes the utility's review of the CPUC fire threat map and their conclusions about the geographical area of the high fire threat areas.

8387(b)(2)(L): Enterprise-wide Safety Risks

Part IV Section B of the TANC WMP comprehensively describes the utility's enterprise-wide safety risk assessment process including how risks are categorized and the criteria used by the TANC to assess risk and the results of previous assessments.

8387(b)(2)(M): Restoration of Service

Part VI Section 2 in the TANC WMP briefly describes the process for the restoration of service after a de-energization or outage.

8387(b)(2)(N)(i): Monitoring and Auditing WMP Implementation, 8387(b)(2)(N)(ii): Identifying and correcting WMP deficiencies, 8387(b)(2)(N)(iii): Monitoring and Auditing the effectiveness of inspections.

Part VII of the TANC WMP describes the process that the TANC to evaluate the WMP. Section B describes how the WMP is monitored and audited by the TANC as well as how deficiencies in the plan are identified. A copy of the most recent audit is included in Table VII-2 and Figure 11 to the WMP. Part VII also contains a description of the how the TANC and WAPA review the effectiveness

of their inspections through cross-checking by other inspection methods, multiple inspection types, and review of inspection results by both TANC and WAPA staff.

5 Wildfire Safety Advisory Board Guidance Advisory Opinions

In November 2022 the WSAB published a report with a description of general recommendations for improving the WMPs for POUs and rural electrical cooperatives. In addition, the report provided specific recommendations for each utility that submitted a WMP for review by the WSAB. Dudek reviewed the WSAB's report, and the section below contains a summary of each recommendation the WSAB had for the TANC's 2022 WMP and whether the 2023 WMP has addressed the WSAB's recommendation (WSAB 2022). The materials published by the WSAB and the recommendations within are for guidance and are not statutory requirements.

1. The WSAB encourages TANC to include including the context setting template from the informational response within the WMP itself in the 2023 comprehensive revision WMP as they consider the proposed template in Appendix 1 for that document.

   Good. The context setting table is on pages 9 & 10.

2. The WSAB expects that there may be more dramatic changes in the 2023 comprehensive revision WMP and encourages TANC to consider appropriate aspects of the template in Appendix 1, while recognizing that TANC has developed a good WMP framework already.

   Good. Dramatic changes not required. TANC improved the level of detail in the WMP regarding wildfire risk drivers and prevention programs described in previous versions of the plan. The 2023 WMP incorporates new descriptions of wildfire prevention strategies, risk drivers, and communication protocols. Also included in an audit of the wildfire prevention programs. The format for the WMP is not difficult to navigate or understand.

3. The WSAB does note that a couple of errors have crept into the 2022 WMP on pages 2 where a trailing sentence was inadvertently added to objective 5 and on page 16 where a closing sentence inadvertently escaped the Contact by Foreign Object bullet.

   Good. The errors noted by the WSAB have been corrected in the 2023 WMP.

4. The WSAB notes that although TANC has a good set of WMP metrics they have included no tracking results information for those metrics to help understand their value and TANC's mitigation progress.

   Metric data is recorded and maintained by WAPA and TANC as required by NERC standards. The WMP does include metric data related to vegetation management accomplishments in Appendix A. Outcome based metrics such as wires down events is considered confidential and will not be published in the WMP.

6 Transmission Agency of Northern California 2022 Progress in Implementing Wildfire Mitigation Plan Wildfire Prevention Strategies on the COTP

As a bulk electricity supplier and an operator of transmission facilities, TANC meets NERC FAC-003-4 standards including vegetation inspections of 100% of applicable lines at least once per calendar year and completing 100% of its annual vegetation work plan. Appendix A contains the TANC's 2020-22 approach and accomplishments regarding the wildfire prevention strategies described in their WMP. TANC accomplished the following.

Vegetation Management

- Fuel Treatment projects performed outside of COTP corridor in collaboration with the USDA Forest Service. Total acres treated:1906.
- 420 hazard trees removed with the Off-ROW (outside of COTP corridor) hazard tree removal in the Shasta-Trinity National Forest.
- Tower base clearing completed along entire length of COTP.
- Fuels reduction treatments performed on 162 acres within the COTP corridor in Tier 2 areas.
- Brushed (removed vegetation along the roadway) and graded 6 miles of access roads in Tier 2 areas.
- Collaborated with the USDA Forest Service to brush, grade, and reconstruct 10 miles of access roads outside of the COTP corridor.

Inspections

- Completed ground inspections at 134 sites within COTP ROW for hazard trees identified by Light Detection and Ranging (LiDAR) analysis in 2021.
- Inspectors completed detailed aerial Tower and equipment inspections for all Tier 2 and Tier 2 areas by June 30, 2022.
- Completed aerial Infrared (IR) scans of all lines within Tier 2 and Tier 3 areas.
- Performed monthly visual inspections of substations in Olinda, Tracy, and Maxwell.
- Performed annual IR survey of substations in Olinda, Tracy, and Maxwell.

Situation Awareness

- Awarded a 5-year contract to collect IR and corona information on equipment on an annual basis for the Tier 2 and Tier 3 areas, and a 5-year basis for the non- (High Fire Threat District (HFTD) areas.

Operational Practices

- TANC trained and licensed three UAV pilots.
- TANC implemented a new inspection data collection software that improves the quality of the data recorded by inspections and reduces time spent managing records.
- TANC annually provides funds for a fire station, engine (engine 345), and firefighters in the Modoc National Forest. This station is in remote area where the COTP corridor pass through and provides fire suppression response to wildfires in the area.

Finally, the TANC COTP WMP does not specifically state the defensible area maintained around the three substations. Based on the inspection of aerial images of the substations, each facility has at least a 100-foot-wide area around all sides that maintained in a minimally or non-combustible conditions. TANC has added Wildfire Strategy No. 21 – described in Table V-6 on page 33 of the 2023 WMP - that addresses microwave site defensible space by applying guidelines developed by the California Department of Forestry and Fire Protection.

7 Wildfire Mitigation Plan Metric Overview

Metrics help POUs determine if their wildfire prevention strategies are effective for reducing the risk of a wildfire ignited by their electrical equipment. Power agencies with transmission facilities comply with NERC standards that includes collecting risk-related metric data. To comply NERC Standard FAC-003-4, TANC has been collecting and utilizing data of vegetation management metrics to prioritize treatment and reduce wildfire risks. When SB 901 was passed in 2019 and POU's began preparing WMPs, TANC adopted many of the metrics for complying with NERC standards including several of vegetation management metrics for the metrics they are using to evaluate the effectiveness of their WMP.

The current TANC-COTP WMP uses elven metrics, the same metrics in the 2022 version of their WMP. The eleven metrics, shown on Table VII-1 in the WMP, include outcome-based metrics such as COTP-ignited wildfires and number of wires down, performance-based metrics such as acres of fuels treated and number of hazard trees removed, and external factor metrics such as number of high fire danger days. Table VII-2 in the WMP connects each wildfire prevention program to the intended wildfire risk addressed and the metric that measures this risk.

WAPA and TANC continuously record and analyze data for each of the metrics described in the plan and use the results of the analysis to guide their vegetation management programs, their inspections, their operations and maintenance procedures, and their equipment upgrades. This metric data is considered confidential information to the TANC and WAPA, and not all the data for each metric is published in the WMP. Appendix A in the WMP contains vegetation management work completed in 2022, including number of acres treated and hazard trees removed which are two of the eleven metrics.

The eleven metrics provide the TANC with a comprehensive picture of the effectiveness of their wildfire prevention strategies. By tracking both performance and outcome metrics TANC can look for negative correlations between prevention strategies and their related metrics to verify their programs' effectiveness. External event metrics provide additional detail, identifying high risk situations when outcome metric events (e.g. wires down or wire to wire contact) also occur during periods of high fire danger.

8 Comparison of Industry Standards and Similar Utility Wildfire Prevention Strategies

The TANC COTP is unique amongst California POUs. The COTP is bulk energy transmission line with no distribution lines or generation facilities. The COTP service territory is a 340-mile-long corridor plus a several distributed substations and microwave communication facilities. The COTP transmission corridor generally does not pass through urban areas along most of its length. The wildfire risk for the COTP corridor is also unique in that the COTP runs through a wide variety of vegetation types and terrain with long sections where portions of the transmission lines are exposed to natural vegetation on both sides of the transmission corridor with no surrounding development or urban areas to break up fuels. As a result, there are no POU's in California and subject to PUC 8387 (b)(2) that will make a good candidate to compare the TANC's 2023 WMP to. Instead, this report will use the relevant standards described in the Reliability Standards for the Bulk Electric Systems of North America (NERC, 2023) .

8.1 Vegetation Management

Along the entire length of the COTP corridor TANC maintains the vegetation to meet FAC 003-4 Transmission Vegetation Management, both within its right-of-way and where agreements with adjacent owners exists, on lands along the length of the corridor. This includes maintaining a 29-foot clearance between any vegetation and transmission wires and hazard tree removal.

8.2 System Hardening

Construction Standards and Equipment Upgrades

All COTP transmission line towers are entirely constructed of lattice or tubular steel so are inherently non-combustible. Conductors and other electrical equipment attached to COTP towers are also constructed out of metal or other non-combustible materials. Transformers, circuits, and other electrical equipment are located at substations are also constructed entirely of non-combustible materials and surrounded by a large area of bare ground. No system hardening or equipment upgrades would result in significant improvements to fire resistance of COTP equipment.

Undergrounding

None of the COTP was constructed underground. TANC does not utilize undergrounding as a strategy for reducing wildfire risk.

Recloser Policy

TANC has recloser policies for the COTP for circuits within and outside of designated HFTDs. . Recloser policies consider ongoing fire activity in the COTP area, current and predicted weather, declaration of Red Flag Conditions, and fuel conditions.

8.3 Situational Awareness

Cameras for Utility Operations, Fire Detection, and Mitigation

TANC in coordination with WAPA, uses a combination of tools to track fire and weather events along the COTP corridor that could impact system reliability. These include networked camera systems that monitor TANC infrastructure and their proximity to wildfires, GIS-based maps of active wildfire incidents, and web-based applications that provide real-time, location specific weather information and forecasts.

9 Conclusion

TANC has prepared a comprehensive WMP for 2023. The plan meets all statutory requirements described in PUC Section 8387(b)(2) for a POU. TANC has also considered the recommendations of the Wildfire Safety Advisory Board and adopted them when appropriate. The TANC's WMP with the provided appendices describes a wildfire mitigation program that accurately assesses the risks and risk drivers present in their service territory and implements preventative strategies that are effective at reducing the wildfire risk of these risks and risk drivers.

Based on the wildfire prevention programs described in the WMP and the progress the TANC has made in its wildfire prevention programs, TANC takes the risk of wildfire in its service territory seriously and is making a serious effort to reduce the risk that its equipment starts or aids in the spread of a wildfire.

Sincerely,

Jeremy Cawn
Fire Protection Planner

Att.: A: Transmission Agency of Northern California WMP IE Report

10 References

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