(U 338-E)

Southern California Edison
Q4 2021 Quarterly Data Report

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Table of Contents

I. INTRODUCTION 2
II. GEOSPATIAL DATA 3
III. NON-SPATIAL DATA TABLES 1-12 6
IV. APPENDIX A 18

I. INTRODUCTION

Pursuant to California Public Utilities Commission (CPUC or Commission) Resolution WSD-011, Attachment 3, as modified by the February 16, 2021 Compliance Operational Protocols (Compliance Protocols), and the Office of Energy Infrastructure Safety's (OEIS or Energy Safety) Final Action Statement on SCE's 2021 Wildfire Mitigation Plan (WMP) Update, this Quarterly Data Report (QDR) includes Southern California Edison Company's (SCE) (1) geospatial database pursuant to the requirements in the September 2021 Geographic Information System (GIS) Data Standard for California Electrical Corporations (GIS Data Schema), Version 2.1 and the related Status Report, in Excel, that further denotes what spatial data SCE is providing at this time; (2) non-spatial data, in Excel, pursuant to the non-spatial Tables 1-12 template; and (3) a description of the data included in the geospatial database and non-spatial Tables 1-12.

SCE's Q4 2021 QDR includes improved geospatial data (age-related data and PSPS polygons) as compared to previous quarterly submissions. SCE appreciates Energy Safety's acknowledgment that utilities are at different stages of their data journey and that the GIS Data Schema is intended to be a phased approach including ongoing changes to the schema. SCE is committed to providing more data and details in subsequent QDR submissions to meet the updated GIS Data Schema requirements.[1] The confidential geodatabase is being submitted through Energy Safety's service. Pursuant to the California Code of Regulations, Title 14, Article 3, Section 29200, please see SCE's application for confidential designation of the data being provided with the Q4 2021 QDR. Further description of the geospatial data and responses to the ongoing Guidance-10 deficiency conditions can be found in Section II and Appendix A.

In addition, SCE includes the non-spatial data, in Excel and in pdf in Appendix B, pursuant to Resolution WSD-011, Attachment 2.3 within Tables 1-12. New data is being provided for recorded Q4 2021 and annual year 2021, where applicable. SCE is also utilizing the new table formats per the 2022 WMP Update Guidelines for Tables 2, 7.1, 7.2, and 12. In some instances, this has resulted in modifications to prior reported periods. Forecasts for Tables 7.1, 7.2, and 12 will be provided with SCE's forthcoming 2022 WMP Update submission. Additionally, SCE includes corrections to data errors that have been identified through further quality review of calculations and data. All new and corrected data are displayed in red font. SCE is also including a pdf version of these tables in Appendix B of this QDR. Section III of this QDR includes a description of the data included in these tables. The non-spatial data in this QDR submission is still undergoing review.

If there are material updates, SCE will provide them in subsequent QDR submittals or earlier, as applicable and to the best of its ability.

[1] Energy Safety released its Final GIS Data Schema, Version 2.2 on January 14, 2022.

II. GEOSPATIAL DATA

Class B deficiency Guidance-10 included in CPUC Resolution WSD-002 requires SCE to submit geospatial data according to the current data taxonomy and schema and to provide details regarding (1) locations where grid hardening, vegetation management, and asset inspections were completed over the prior reporting period, clearly identifying each initiative and supported with GIS data; (2) the type of hardening, vegetation management and asset inspection work done, and the number of circuit miles covered, supported with GIS data; (3) the analysis that led it to target that specific area and hardening, vegetation management or asset inspection initiative; and (4) hardening, vegetation management, and asset inspection work scheduled for the following reporting period. The GIS Data Schema includes additional geospatial data requirements beyond the four items above. Below, SCE explains the geospatial data it is providing in this Q4 2021 QDR.

This QDR provides recorded GIS data for the October through December 2021 period and projected GIS data for the January through March 2022 period, where available, pursuant to the v2.1 GIS Data Schema.[2] As noted in the Introduction, SCE is unable to provide all requested data at this time. This QDR includes the wildfire initiatives included in SCE's 2021 WMP Update. SCE appreciates Energy Safety's acknowledgment of comments from the IOUs regarding the volume and scope of quarterly data reporting requirements and how Energy Safety plans to continue to work with stakeholders to ensure the GIS Data Schema requirements can be met.[3]

This QDR includes the geospatial Initiative,[4] Asset Point, Asset Line, PSPS Event, Risk Event, and Other Required Data datasets. SCE is not providing metadata in this submission given that we first must focus on obtaining as much data as possible pursuant to the requirements and Energy Safety has informed that further refinements to the GIS Data Schema will be issued. Additionally, some data elements within the datasets SCE is providing are not available due to either our inability to correlate data from multiple systems within the available times or because SCE does not currently capture the requested data.

There are also a couple items of note in this Q4 QDR submission with regard to additional data versus what SCE has previously been able to provide. First, SCE has provided asset aging data for equipment and structures found in the following Asset Point feature classes: Connection Device, Customer Meter, Substation, Support Structure, Switch Gear, Weather Station, Transmission Line, Primary Distribution Line and Secondary Distribution Line. Second, SCE has also provided the PSPS polygon shape data associated with all Q4 outage areas.

SCE appreciates that Energy Safety, through its comprehensive updated GIS Data Schema, intends

[2] *See* Energy Safety's September 2021 GIS Data Reporting Standard Version 2.1.

[3] Resolution WSD-011, p. 12.

[4] The Initiative dataset includes grid hardening, vegetation management (projects & inspections), and asset inspections initiatives where work was performed and/or projected to be performed in HFRA over the reporting periods and does not include the following: SH-2 (Undergrounding Overhead Conductor), where work orders for the reporting period are in the process of being closed, and VM-5 (Quality Control) because the work was operationalized in 2020.

to obtain and standardize significant amounts of wildfire-related data. SCE also understands Energy Safety's desire to understand our current systems and data availability. To this end, SCE also provides updated responses in the Status Report in the Excel file template that generally describe the status of the requested data fields, actions we plan to take if a particular data field is not being provided at this time, the timeline for completing those actions, and whether the data is confidential. SCE describes its approach to the updated Status Report template below.

SCE also notes that it does not capture several data elements that still require time for our teams and subject matter experts to assess with respect to the labor, operational, system and technical requirements and to ensure these new data requirements could advance wildfire risk reduction prior to changing work methods, processes, tools and systems. SCE has made some progress in this area but is still in the process of assessing all of these data requirements. SCE has taken steps to assess and estimate timelines as they pertain to Vegetation Management (VM) photo submission as part of the ongoing quarterly data submittal. SCE is taking these steps as part of implementing improved vegetation management systems and processes. These timelines are based on prioritization of SCE's critical technology implementations. SCE provides a general response in the Status Report that discusses the assessments in further detail. While SCE understands that Energy Safety desires specific timelines to address all data gaps, we are not able to provide all assessments with this QDR submission. Future submissions will look to include specific information similar to the status of the VM photos discussed above.

Similar to its previous QDR, the requested spatial data is being provided in the geodatabase. Additionally, SCE is submitting an updated Status Report based on the datasets, described above. SCE notes that it continues to take a phased approach to improve the data being provided. SCE looks forward to continued collaboration with Energy Safety, utilities, and other stakeholders to refine and improve the GIS Data Schema. Responses to the specific Guidance-10 conditions are detailed below.

i. locations where grid hardening, vegetation management, and asset inspections were completed over the prior reporting period, clearly identifying each initiative and supported with GIS data

Please see the geodatabase that includes grid hardening, vegetation management and asset inspection initiative data completed in HFRA from October 2021 through December 2021. As noted above, SCE also provides in the geodatabase other feature class datasets in support of Energy Safety's direction to provide as much information as practicable and is readily available. The additional datasets include Asset Line, Asset Point, PSPS Event, Risk Event, and Other Required Data.

ii. the type of hardening, vegetation management and asset inspection work done, and the number of circuit miles covered, supported with GIS data

SCE is providing data associated with its system hardening, vegetation management, and asset inspection initiatives described in our 2021 WMP Update. The specific WMP initiatives are shown in the table in Appendix A. Most wildfire initiatives are not planned, managed, or executed based on the number of circuit miles (or miles) and thus line geometry for these initiatives is not available. This is consistent with Resolution WSD-011, Attachments 2.1 and 2.3 that describe how

the number of circuit miles unit of measurement is not applicable for certain types of work. The limited initiatives that do have line geometry, circuit miles or miles are available in the geodatabase. SCE notes that line geometry for covered conductor is available at the project scoping level, which has been replicated for each of the resulting work orders (which is the lower level at which dates are managed and the level of detail provided in this GIS submission). These work orders show that SCE completed approximately 434 circuit miles of covered conductor from October 2021 through December 2021.[5] For circuit-based distribution and transmission inspections, the entire circuit geometry has been included.

iii. the analysis that led it to target that specific area and hardening, vegetation management or asset inspection initiative

SCE first provided its risk-based analyses for how it determines and targets deployment for its wildfire-related initiatives in its July 27, 2020 Remedial Compliance Plan (RCP) to Guidance-3 and provided updates in its 2021 WMP Update, Q1 and Q2 2021 QDR, and its 2021 Revised WMP Update. Please see Section 7.3.2 of SCE's Revised 2021 WMP Update for current information regarding methods SCE employs to analyze and prioritize work for grid hardening, vegetation management and asset inspection initiatives. In Appendix A, SCE summarizes the analysis that led it to target the areas where its system hardening, vegetation management and asset inspection initiatives were completed from October through December 2021. Please also see Section 4.3 and Appendix 9.8 of SCE's Revised 2021 WMP Update that describes SCE's improvements to its risk modeling.

iv. hardening, vegetation management, and asset inspection work scheduled for the following reporting period, with the detail in (i) – (iii).

Please see the geodatabase that includes grid hardening, vegetation management and asset inspection initiatives planned in HFRA from October through December 2021 pursuant to the latest GIS Data Schema. Similar to part (ii) above, limited initiatives have line geometry (i.e., circuit miles or miles). Initiatives with line geometry are available in the geodatabase. SCE notes that line geometry for covered conductor is available at the project scoping level, which has been replicated for each of the resulting work orders (which is the lower level at which dates are managed and the level of detail provided in this GIS submission). These work orders show approximately 302 circuit miles planned for January through March 2022. Also, line geometry for planned circuit-based distribution and transmission inspections includes the entire circuit geometry, not just partial geometry of the circuit. Please see the table in Appendix A and Sections 4.3 and 7.3.2 of SCE's Revised 2021 WMP Update with the detail for condition (iii).

[5] SCE notes that there is a time lag and spatial differences in translating this work order data into the geodatabase. This also applies to the work projected in the following reporting period.

III. NON-SPATIAL DATA TABLES 1-12

Introduction:
SCE's approach to updating Tables 1-12 of the non-spatial data requirements for this Q4 2021 QDR includes 1) updating data with actuals for tables that require Q4 quarterly updates and for tables that require annual updates, and 2) corrections to data errors that have been identified through discovery and further quality review of calculations and data.

Table 1: Recent Performance on Progress Metrics
Table 1 provides a seven-year history (2015-2021) including recorded data through Q4 2021, where applicable, of Progress Metrics as defined by the 2021 WMP Guidelines. Updates to current and previous findings are in red font. For this Q4 2021 submission, many of these updates are a result of the new format being used for Table 2 (see below). The comment section for each metric in the table provides details of the source and data that was used or explanations for why certain data changed or is not available.

Metric Type 1 asks for inspection counts for different inspection category types for transmission and distribution in circuit miles. SCE accounts for completed inspections by noting the counts of assets inspected instead of noting by circuit miles. In order to present completed inspections in the requested format, SCE uses a calculated average span length multiplied by the number of structures inspected. Additionally, rows were added to inspection types (1c, ii-iv) in order to provide additional detail of inspection data collected as part of SCE's detailed inspection program. The drivers and programmatic inspection changes can be seen in SCE's 2021 WMP Update in Section 7.3.4.9.1 for Distribution and Section 7.3.4.10.1 for Transmission.

Metric Type 2 asks for the number of spans inspected for vegetation compliance. SCE accounts for completed vegetation compliance inspections by circuit miles. In order to present completed vegetation compliance inspections in the requested format, SCE divides the recorded circuit miles inspected by the calculated average span length.

Metric Type 3, customer outreach metrics, requires information not accounted for or maintained by SCE as SCE has no jurisdiction over evacuation orders. SCE previously diligently requested and followed up with local governments and law enforcement and was only able to obtain information from one county. Even then, the information provided included high-level estimations of evacuation counts estimated by the local government and law enforcement entity for a very limited set of fires. Because of this, SCE is unable to obtain the requested data, analyze it, and report on evacuation related requirements in this table. SCE anticipates this to be a recurring challenge going forward.

See Table 1 "Recent performance on progress metrics" for more detail.

Table 2: Recent Performance on Outcome Metrics
Table 2 provides a seven-year history (2015-2021) including recorded data through Q4 2021, where applicable, of Outcome Metrics, which SCE has incorporated via the new format of Table 2 per the 2022 WMP Update Guidelines. In some cases, this has resulted in modifications to prior reported periods, which may also impact Table 1 for metrics that appear in both tables. Updates to current and previous findings are in red font. Comments are included in the table to provide additional details about the data provided or indicate if the data was corrected or is not available or not applicable for the

past seven years or through Q4 2021. The information provided in conjunction with the "utility-ignited" wildfire statistics should not be construed as an admission of any wrongdoing or liability by SCE. SCE further notes that to the extent the damages metrics were obtained from other agencies, SCE does not guarantee the accuracy of such information. Additionally, in many instances, the cause of wildfires is still under investigation and even where an Authority Having Jurisdiction (AHJ) has issued a report on the cause, SCE may dispute the conclusions of such a report.

See Table 2 "Recent performance on outcome metrics" for more detail.

Table 3: List and Description of Additional Metrics

Metrics and underlying data are critical components for WMP development, execution, and evaluation, but we continue to emphasize that the near-term focus should be on efficient implementation of our planned activities, while the assessment of whether the activities are having the desired and expected impact on risk reduction should be measured over a longer time horizon. A clear distinction is necessary between metrics that can help monitor compliance with approved WMPs and those that can help evaluate effectiveness of these approved plans and inform future WMP updates.

As in 2019 and 2020, we provide annual Program Targets for each WMP activity which establish goals to evaluate compliance. As stated in previous filings and submittals, tracking Program Targets for approved WMPs is the best means of determining progress and assessing WMP compliance in the near term.

In its response to Guidance-5, SCE proposed five outcome-based metrics, to gauge the effectiveness of the portfolio of its wildfire mitigation activities. These outcome-based metrics are:

1. CPUC reportable ignitions in HFRA (total and by key drivers including CFO, wire-to-wire contact, tree-caused circuit interruptions, and EFF)
2. Faults in HFRA (total and by the key drivers mentioned above)
3. Wire-down incidents in HFRA
4. Number of impacted customers and average duration of PSPS events
5. Timeliness and accuracy of PSPS notifications

SCE proposed these outcome-based metrics because WMP activities are ultimately designed to reduce wildfire ignitions associated with its electrical infrastructure and reduce the impact of PSPS de-energization events to customers. Faults and wire-down events are also key metrics as they are leading indicators of potential ignitions. Importantly, these metrics are within the reasonable control of utilities when appropriately normalized for weather and other exogenous factors. Other metrics such as safety incidents, acres burned or structures destroyed, though important to understand and drive California's fire mitigation efforts, are impacted by events and circumstances largely outside of the utility's control such as climate change, fire suppression efforts and fire response. Therefore, these are not appropriate WMP effectiveness metrics.

Most of SCE's proposed WMP activities are selected to improve these metrics over time, while the remainder are enabling activities to support and supplement those WMP activities. Table SCE-1, updated since the 2021 WMP Update submission, demonstrates how each of SCE's 2021 WMP activities map to the five outcome-based metrics.

Table SCE-1
Activity to Metric Mapping

Activity	Initiative	Ignitions	Faults	Wire Downs	PSPS # Impacted & Average Duration	PSPS Notification Timeliness & Accuracy	Enabling
SA-1	Weather Stations				X	X	
SA-2	Fire Potential Index (FPI)				X	X	
SA-3	Weather and Fuels Modeling System				X	X	
SA-4	Fire Spread Modeling				X	X	
SA-5	Fuel Sampling Program				X	X	
SA-7	Remote Sensing / Satellite Fuel Moisture				X	X	
SA-8	Fire Science Enhancements				X	X	
SA-9	Distribution Fault Anticipation (DFA)	X	X	X			
SH-1	Covered Conductor	X	X	X	X		
SH-2	Undergrounding Overhead Conductor	X	X	X	X		
SH-4	Branch Line Protection Strategy	X		X			
SH-5	Installation of System Automation Equipment – RAR/RCS				X	X	
SH-6	Circuit Breaker Relay Hardware for Fast Curve	X		X			
SH-7	Circuit Evaluation for PSPS-Driven Grid Hardening Work				X		
SH-8	Transmission Open Phase Detection	X					
SH-10	Tree Attachment Remediation	X	X	X			
SH-11	Legacy Facilities	X	X	X			

Activity	Initiative	Ignitions	Faults	Wire Downs	PSPS # Impacted & Average Duration	PSPS Notification Timeliness & Accuracy	Enabling
SH-12	Microgrid Assessment				X		
SH-13	C-Hooks	X	X	X			
SH-14	Long Span Initiative (LSI)	X	X	X			
SH-15	Vertical Switches	X	X				
IN-1.1	Distribution Ground / Aerial Inspections and remediations	X	X	X			
IN-1.2	Transmission Ground / Aerial Inspections and remediations	X	X	X			
IN-3	Infrared Inspection of energized overhead distribution facilities and equipment	X	X	X			
IN-4	Infrared Inspection, Corona Scanning, and High Definition imagery of energized overhead Transmission facilities and equipment	X	X	X			
IN-5	Generation Inspections and Remediations	X	X	X			
IN-8	Inspection Work Management Tools						X
VM-1	Hazard Tree Management Program	X	X	X			
VM-2	Expanded Pole Brushing	X	X	X			
VM-3	Expanded Clearances for Legacy Facilities	X	X	X			
VM-4	Dead and Dying Tree Removal	X	X	X			

Activity	Initiative	Ignitions	Faults	Wire Downs	PSPS # Impacted & Average Duration	PSPS Notification Timeliness & Accuracy	Enabling
VM-6	VM Work Management Tool (Arbora)						X
PSPS-2	Customer Care Programs (Includes CRCs, CCVs, Battery Backup Programs, Well Water and Water Pumping Backup Generation, Resiliency Zones)						X
DG-1	Wildfire Safety Data Mart and Data Management (WISDM / Ezy)						X
DEP-2	SCE Emergency Responder Training						X
DEP-1.2	Customer Education and Engagement - Community Meetings						X
DEP-1.3	Customer Education and Engagement - Marketing Campaign						X
DEP-4	Customer Research and Education						X
DEP-5	Aerial Suppression						X

Table 3 provides the performance metrics and units SCE uses to evaluate performance within each of these outcome-based metrics, including historical performance over the past seven years (2015-2021) including recorded data through Q4 2021.

As described in SCE's response to Guidance-5, there might be annual variances in these metrics driven by uncontrollable factors such as weather, and effectiveness of WMP activities can be best assessed using longer-term trends in these outcome-based metrics. It will also be important to consider factors such as overall risk exposure, the population size of the assets, scope of work completed, and fire suppression by third party agencies when using these outcome-based metrics. These metrics cannot be used to measure progress or compliance per approved plans in the short term. To appropriately

evaluate the effectiveness of its WMP activities, SCE is developing suitable quantitative and repeatable methods to measure and normalize these outcome-based metrics. We look forward to collaborating with Energy Safety, utilities, and other stakeholders to agree on how these metrics should be appropriately measured and used to draw pertinent conclusions.

CPUC Reportable Ignitions in HFRA, Faults in HFRA, and Wire Downs incidents in HFRA
Large variations in weather events, including temperature, rainfall, fuel moisture and wind, can heavily impact outcome-based metrics including faults, wire-down events and ignitions, and can often skew direct comparisons of these metrics year over year.

SCE is monitoring the number of faults at the circuit level and ignitions and wire-down events at the structure level and by key driver (CFO, EFF, and other) both before and after the deployment of select WMP wildfire activities. By observing the key drivers of these events down to the circuit or individual structure level, SCE is building the capability to better evaluate the effectiveness of wildfire activities that were deployed to mitigate those specific drivers, as well as help align future deployment of mitigations to target specific drivers identified at those locations.

SCE continues to focus on maturing its modeling capabilities to provide forecasts of future ignitions across HFRA, incorporating the benefits of wildfire activities to reduce ignitions as well as normalizing exogenous factors such as weather, to provide an expected range of ignitions in future years across HFRA. In its 2021 WMP Update, SCE incorporated the estimated benefits of wildfire activities, including covered conductor, vegetation mitigation, inspection mitigation, in reducing the POI at each individual pole or structure level, and includes this reduction of ignition risk when forecasting expected ignitions. At this time, SCE does not incorporate weather normalization into its WMP ignition forecasts due to the complexity of determining the causal relationship between aberrant weather and ignition probability and fire spread.

SCE is currently evaluating different approaches to normalize exogenous factors, including but not limited to, weather and 3rd party suppression efforts. As SCE continues to focus on prudent and effective grid operations, inspections & maintenance, improvements to standards and timely equipment upgrades, it is recognized that although these actions will not entirely eliminate risk, they are expected, in aggregate, to result in overall improvements in outcome metrics, such as faults, wire-downs and ignition events associated with SCE's electrical infrastructure.

Number of impacted customers during and average duration of PSPS events
As more sectionalization equipment, covered conductor, and other grid hardening activities are deployed, de-energization thresholds can be raised, reducing the number of circuits and circuit segments that will need to be de-energized during extreme weather conditions. Improved weather and fire modeling capabilities along with enhanced operational protocols can also help reduce the frequency and duration of PSPS events. However, to assess the effectiveness of the WMP activities in reducing the frequency and scope of PSPS de-energizations, the total number of customers affected or the duration of outages during any period need to be normalized for the intensity of weather events, how widespread the weather events were, and the duration of the events as these can influence the number of circuits or circuit segments that have to be de-energized. In addition to weather, these metrics have to account for customer density on impacted circuits and other factors outside SCE's control. SCE is currently evaluating how metrics such as windspeed, FPI, etc., can be used to appropriately normalize the number of impacted customers and duration of PSPS events. The historical

performance through Q4 2021 can be found in Table 3.

Timeliness and accuracy of PSPS notifications
SCE provides information on the timeliness and accuracy of PSPS notifications in post-event reports. SCE is re-evaluating the calculation of these metrics and benchmarking with the other IOUs to understand best practices. SCE welcomes Energy Safety's guidance as well.

Table 4: Fatalities Due to Utility Wildfire Mitigation Initiatives
Table 4 provides a seven-year history (2015-2021) including recorded data through Q4 2021, where applicable, of fatalities associated with utility wildfire mitigation initiatives as defined by the 2021 WMP Guidelines.

See Table 4 "Fatalities due to utility wildfire mitigation initiatives" for more detail.

Table 5: OSHA-Reportable Injuries Due to Utility Wildfire Mitigation Initiatives
Table 5 provides a seven-year history (2015-2021) including recorded data through Q4 2021, where applicable, of OSHA-reportable injuries associated with utility wildfire mitigation initiatives as defined by the Guidelines. SCE does not use OSHA-reportable contractor and public incidents, as there is no direct employment relationship and no requirement to report to OSHA. However, SCE does monitor CPUC-reportable incidents, which have similar thresholds for identification and reporting (i.e., fatality or personal injury rising to the level of in-patient hospitalization, and in connection with utility assets). To provide a more complete data set, SCE provides data in Table 5 related to the "Contractor" and "Member of the Public" rows that correspond to CPUC-reportable incidents.

See Table 5 "OSHA-reportable injuries due to utility wildfire mitigation initiatives" for more detail.

Table 6: Weather Patterns
Table 6 provides a seven-year history (2015-2021) including recorded data through Q4 2021, where applicable, of weather patterns as defined by the Guidelines. The comment section for each metric in the table provides details of the source and data that was used or explanations for why certain data is not available.

The first row in Table 6 is populated with historical data on Red Flag Warning (RFW) by circuit mile days per year. The RFW circuit-mile days are based on all overhead distribution and transmission circuits that traverse through the National Weather Service (NWS) Fire Weather Zone (FWZ) from a historical database of RFW events from the NWS. The overhead lengths of distribution and transmission circuits are calculated within each FWZ polygon (area divided geospatially into over approximately 1,000 space areas). All circuit lengths within that FWZ polygon are then multiplied by the number of days (or fraction of days) that a particular polygon had an RFW in effect.

The 2021 WMP Guidelines require that SCE use RFW circuit mile days per year data to normalize data required in other tables. SCE recommends that OEIS consider using the National Fire Danger Rating System (NFDRS), which all fire agencies use to determine daily fire danger risk, instead of RFW data. NFDRS is a system that allows fire managers to estimate today's or tomorrow's fire danger for a given area. It combines existing and expected states of selected fire danger factors into one or more qualitative or numeric indices that reflect an area's protection needs. Fire danger ratings are

typically reflective of the general conditions over an extended area, often tens of thousands of acres, where a possible wildfire could start. Fire danger ratings describe conditions that reflect the potential, over a large area, for a fire to ignite, spread and require suppression action.

See Table 6 "Weather patterns" for more detail.

Table 7.1: Key Recent and Projected Drivers of Risk Events
Table 7.1 provides a seven-year history (2015-2021) including recorded data through Q4 2021, where applicable, which SCE has incorporated via the new format of Table 7.1 per the 2022 WMP Update Guidelines. In some cases, this has resulted in modifications to prior reported periods. Moreover, ignition data no longer appears in Table 7.1, but solely in Table 7.2. Updates for Q4 and data corrections made to previous quarters can be found in red text font. Forecasts for this table will be provided with SCE's forthcoming 2022 WMP Update submission.

The comment section for each metric in the table provides details of the source and data that was used or corrected or explanations for why certain data is not available.

To calculate the recent drivers of risk events, SCE utilized the following data sources:

- SCE's Outage Management System (OMS) and Outage Data and Reliability Metrics (ODRM) interface
- Wire-down data to determine if the conductor failure led to a wire-down event
- Repair work records from SCE's asset data in systems, applications & products (SAP) to identify failures

For purposes of this QDR, transmission lines refer to all lines at or above 65 kV, and distribution lines refer to all lines below 65 kV. Transmission faults and wire-downs are typically on transmission lines 65 kV and above but may include some lower voltages (from an operational perspective, SCE also treats its 55 kV lines as transmission).

To populate wire-down data for each driver, SCE has previously used its wire-down database containing repair orders. As noted in the Q3 2021 QDR submission, SCE has reviewed prior period transmission wire down data and is providing a retroactive update in this Q4 2021 QDR submission. Additionally, SCE performed a broader deep dive on failure data which identified two datasets that were not previously included in its wire down reporting. This has resulted in the inclusion of additional wire down events, the vast majority of which occurred from 2016-2018 on distribution secondaries and service lines in the Non-HFTD. SCE notes that these additional events do not impact its Probability of Ignition (POI) models, which rely on outage and ignition data, not wire down data. Nonetheless, given the potential associated risk, SCE has initiated a dedicated effort aimed at secondary conductor inspection and remediation, as outlined in its forthcoming 2022 WMP Update. These updates also impact total wire down data in Tables 2 and 3. Updates to current and previous findings are in red font.

To populate outage data for each driver, SCE used ODRM outage cause codes. ODRM database records and catalogs outage impacts and causes, determined by the cooperation of field, operations, and engineering employees.

For forecasts, SCE first creates a baseline forecast for wire-down and outages based on timeseries forecasting. Time-series forecasting uses historical patterns to create a forecast and can capture

variation over smaller periods compared to other forecasting methods. Then, the baseline forecast is subjected to the same methodologies used for RSEs, whereby SCE estimated the mitigation effectiveness of programs by risk drivers and determined the risk reduction, given the exposure and scope of the program, to incorporate the effects of SCE's various wildfire programs into the forecasts.

See Table 7.1 "Key recent and projected drivers of risk events" for more detail.

Table 7.2: Key Recent and Projected Drivers of Ignition Probability by HFTD Status
Table 7.2 provides a seven-year history (2015-2021) of key recent and projected drivers of ignitions by HFTD tier, which SCE has incorporated via the new format of Table 7.2 per the 2022 WMP Update Guidelines. Updates to current findings and the new "System" subtotals are in red font. Forecasts for this table (i.e., 2022 projections) will be provided with SCE's forthcoming 2022 WMP Update submission.

The comment section for each metric in the table provides details of the source and data that was used or explanations for why certain data was corrected or is not available.

For purposes of this QDR, transmission lines refer to all lines at or above 65 kV, and distribution lines refer to all lines below 65 kV. Transmission faults and wire-downs are typically on transmission lines 65 kV and above but may include some lower voltages (from an operational perspective, SCE also treats its 55 kV lines as transmission).

To populate the ignitions per year for each driver, SCE used CPUC reportable data filed for 2015 through 2021. The CPUC reportable data contains date and time, latitude and longitude, voltage, location, suspected initiating event, and driver and sub-driver (e.g., animal contact, balloon contact, and transformer failure) categories. SCE mapped the suspected initiating event to the driver and sub-driver categories for 2015 through 2021.

For forecasts, SCE first creates a baseline forecast for ignitions based on time-series forecasting. Timeseries forecasting uses historic patterns to create a forecast and can capture variation over smaller periods compared to other forecasting methods. Then the baseline forecast is subjected to the same methodologies used for RSEs, whereby SCE estimated the mitigation effectiveness of programs by risk drivers and determined the risk reduction given the exposure and scope of the program to incorporate the effects of SCE's various wildfire programs into the forecasts.

See Table 7.2 "Key recent and projected drivers of ignitions by HFTD region" for more detail.

Table 8: State of Service Territory and Utility Equipment
Table 8 provides a seven-year history (2015-2021), where applicable, of state of service area and utility equipment as defined by the 2021 WMP Guidelines.

The comment section for each metric in the table provides details of the source and data that was used or explanations for why certain data was corrected or is not available.

Table 8 lists the current baseline state of SCE's service area in terms of overhead circuit miles for distribution and transmission lines, substations (only in-service, not including third-party owned), and critical facilities. The table also lists the number of customers in WUI zones and by HFRA tier/zone.

HFTD Zone 1 cells only reflect portions of SCE's HFRA that are outside of HFTD Tier 2 and Tier 3 areas. Zone 1 areas that are wholly contained within Tier 2 and Tier 3 areas are reflected in those respective tiers. The WUI area delineation is based on a GIS layer published by the University of Wisconsin-Madison.

It is important to note, that GIS models are updated frequently to reflect changes within SCE's service area and for data clean-up. SCE does not have the ability to analyze and calculate information in previous years. As such, only 2020 information was obtained from GIS. 2015-2018 data is not available and 2019 data is the same as what was provided in SCE's 2020 WMP filing.

Previously, SCE has noted that it does not record all customers that are designated as AFN customers and as such, data provided for the AFN population only included SCE customers enrolled in MBL and/or Low-Income (i.e., enrolled in the CARE/FERA) programs. However, SCE has been engaged efforts to provide additional AFN categories and will do so as part for 2021 data as part of its forthcoming 2022 WMP Update submission.

See Table 8 "State of service area and utility equipment" for more detail.

Table 9: Location of Actual and Planned Utility Equipment Additions or Removal Year Over Year

Table 9 provides a six-year history (2015-2020), where applicable, as well as projections through 2022 of location of actual and planned utility equipment additions or removal, year over year, as defined by the 2021 WMP Guidelines. The comment section for each metric in the table provides details of the source and data that was used or explanations for why certain data is not available. For this Q4 2021 QDR submission, SCE has not yet finalized 2021 actuals but is seeking to do so with its forthcoming 2022 WMP Update submission.

Table 9 provides planned additions, removals, and upgrades of utility equipment by the end of the three-year plan term. SCE does not routinely follow planned additions, removals, or upgrades by circuit mile, population density, or WUI. While SCE has a number of planned distribution projects over the next few years, the projects are not far enough along in the project lifecycle to have a complete list of affected structures (new or existing), circuit path/route geometries, and/or geospatial coordinates associated with them. Therefore, SCE is unable to map the distribution projects in GIS and subdivide as requested. The planned work with a well-developed scope and geospatial properties are typically major, longer lifecycle transmission and substation projects that have detailed engineering and/or a Certificate of Public Convenience and Necessity (CPCN) or Permit To Construct (PTC) from the Commission. Therefore, the only planned work that SCE included here are (1) transmission projects that have known, planned geospatial geometries (circuit path/route) that can be uploaded to GIS tools and then divided by population density, WUI, and HFTD Tier/Zone and (2) known, planned substation projects (of which SCE has one in the next three years, Safari Substation). Additionally, SCE plans to install at least 375 weather stations and will strive for approximately 475 additional weather stations between 2021 and 2022, but actual site/structure locations have not yet been determined and SCE is therefore unable to provide the locational attributes as requested.

The WUI area delineation is based on a GIS layer published by the University of Wisconsin-Madison.

See Table 9 "Location of actual and planned utility equipment additions or removal year over year" for

more detail.

Table 10: Location of Actual and Planned Utility Infrastructure Upgrades Year over Year
Table 10 provides a six-year history (2015-2020), where applicable, as well as projections through 2022 of location of actual and planned utility infrastructure upgrades year over year as defined by the 2021 WMP Guidelines. The comment section for each metric in the table provides details of the source and data that was used or explanations for why certain data is not available. For this Q4 2021 QDR submission, SCE has not yet finalized 2021 actuals but is seeking to do so with its forthcoming 2022 WMP Update submission.

Table 10 provides planned additions, removals, and upgrades of utility equipment by the end of the three-year plan term. For the reasons explained in the Table 9 section above, the only planned work included in Table 10 are transmission and substation projects that have known, planned geospatial geometries.

The WUI area delineation is based on a GIS layer published by the University of Wisconsin-Madison.

See Table 10 "Location of actual and planned utility infrastructure upgrades year over year" for more detail.

Table 11: Recent use of PSPS and other PSPS Metrics
Table 11 provides a seven-year history (2015-2021) including recorded data through Q4 2021, where applicable, of recent use of PSPS and other PSPS metrics as defined by the 2021 WMP Guidelines. As of Q2 2021, SCE is currently unable to provide planned outage data metrics due to recent IT system implementation issues. SCE is actively investigating this issue and will provide the data when it is available. This affects rows 2a., 2c., 2d., 2e., and 2f. The comment section for each metric in the table provides details of the source and data that was used or explanations for why certain data was corrected or is not available.

Table 11 represents the frequency, scope, and duration of PSPS events in total. A combination of data from SCE's OMS and data recorded by documentation specialists during actual PSPS events was used for the historical information including data through Q4 2021.

Please see Table 11 for updates to SCE's use of PSPS protocols and other related metrics.

Table 12: Mitigation Initiative Financials
Table 12 initially provided 2020 recorded costs and 2021 through 2022 forecasts by initiative.

In this Q4 2021 submission, SCE has populated Table 12 using the 2022 WMP Update Guidelines format, providing annual actuals through 2021. The 2022 forecast will be provided with SCE's 2022 WMP Update. The activity structure as presented also reflects SCE's forthcoming 2022 WMP Update, which has introduced a few new activities and/or resulted in some minor activity grouping changes.

Regarding the Territory and HFTD split requested per the 2022 WMP Update Guidelines, SCE has taken three approaches.

(1) Wildfire activities – SCE deploys its wildfire activity spend to mitigate risk in the HFTD. Accordingly, spend for wildfire activities is shown as entirely within HFTD (i.e., Territory

spend = HFTD spend).

(2) Vegetation management to achieve clearances around electric lines and equipment – SCE is complying with the 2022 WMP Update Guidelines by setting forth these costs broken down by HFTD and Non-HFTD. SCE notes, however, that this estimate reflects SCE's attempt to reasonably allocate these costs across its service area pursuant to respective tree counts and trim cadences in the HFTD and Non-HFTD areas, respectively. From an operational perspective, though, the same vegetation management contract crews often work in both HFTD and Non-HFTD areas, sometimes on the same days, making it difficult to precisely calculate the costs incurred in different areas. SCE further notes that from a regulatory cost recovery perspective, the CPUC's SCE 2021 General Rate Case Final Decision (D.21-08-036) authorized a Vegetation Management Balancing Account (VMBA) that does not differentiate between HFTD and Non-HFTD areas. Accordingly, SCE records all vegetation management line clearance costs in the VMBA, irrespective of where the trims take place.

(3) All other non-wildfire activities – Similar to vegetation line clearing, SCE does not track the HFTD vs. Non-HFTD split of its non-wildfire activities. For these other non-wildfire activities, SCE has not developed the means to estimate a split. Accordingly, all spend for these activities is simply shown in the Territory column, though this is not to imply that no spend occurs in the HFTD areas.

IV. APPENDIX A

Appendix A
Analysis That Led SCE To Target Specific Areas for Initiatives in 2021

#	Initiative ID	Initiative / Activity	Analysis that Led to Target Specific Area	Cite to 2021 WMP Update
1	IN-1.1	Distribution Ground / Aerial Inspections and remediations	Beginning in inspection year 2020, SCE embarked on an effort to reimage it's asset inspection programs, moving from a strictly compliance-based program to one that prioritizes the inspection of the highest risk assets throughout the service area consistent with regulatory compliance obligations. Specifically, in the Overhead Detailed Inspection (ODI) space, SCE implemented a risk characterization and prioritization schema so that the highest risk assets in SCE's High-Fire Risk Areas (HFRA) would be inspected earlier in the inspection cycle and on a more frequent basis. The primary objective of this program being to identify and mitigate any potential system issues prior to peak fire season. The risk model SCE deployed to prioritize asset inspections was based on the probability of asset failure and the potential consequence of destruction if that particular asset failure were to occur. The 2021 scope is based on the Technosylva model Utilizing this risk model, the HFRA inspection scope was identified and prioritized for operational execution. The structures that were identified as the highest risk were individually identified, plotted, and scheduled for inspection. As opposed to inspecting entire grids as was the practice under the normal compliance-driven program, individual structures were prioritized for inspection based on their risk characteristics, thus allowing the company to inspect the highest risk assets throughout the entire service territory before peak fire season. The objective of this inspection methodology was to reduce the overall system risk in the most vulnerable areas by clustering the highest risk poles together in individual Work Orders for our Electrical System Inspectors (ESIs) to perform detailed inspections. Also included in the work scope is compliance-due structures in HFRA. Additionally, prior to the typical start of the 2021 fire season, SCE has identified Areas of Concern (AOCs) in its HFRA, primarily driven by elevated dry fuel levels that pose increased fuel-driven and wind-driven fire risk. This threat is magnified during periods of high wind, high temperatures and low humidity. In order to mitigate emergent risk, SCE is accelerating inspections, remediation and vegetation trimming (and potentially identifying new inspections) in the identified AOCs. The methodology to identify AOCs is based on several factors including fire history, weather conditions, fuel type, exposure to wind, egress, etc. The methodologies described above were used to target the recorded and projected areas provided in the geodatabase.	Section 7.3.4.9.1
2	IN-1.2	Transmission Ground / Aerial Inspections and remediations	The Transmission High Fire Risk Informed Inspection program utilizes the same approach as the Distribution High Fire Risk Informed Inspection program (IN-1.1) for prioritizing work. The 2021 scope is based on the Technosylva model. Also included in the work scope is compliance-due structures in HFRA. Additionally, prior to the typical start of the 2021 fire season, SCE has identified Areas of Concern (AOCs) in its HFRA, primarily driven by elevated dry fuel levels that pose increased fuel-driven and wind-driven fire risk. This threat is magnified during periods of high wind, high temperatures and low humidity. In order to mitigate emergent risk, SCE is accelerating inspections, remediation and vegetation trimming (and potentially identifying new inspections) in the identified AOCs. The methodology to identify AOCs is based on several factors including fire history, weather conditions, fuel type, exposure to wind, egress, etc. The methodologies described above were used to target the recorded and projected areas provided in the geodatabase.	Section 7.3.4.10.1
3	IN-3	Infrared Inspection of energized overhead Distribution facilities and equipment	The Distribution Infrared Scanning (DIRS) program targets inspecting / scanning 50% of aggregate HFRA each calendar year and 100% of overhead structures in HFRA every two calendar years. The 2021 infrared inspection scope was based on Tier 2 and Tier 3 HFRA and begins a new two-year cycle with the goal to inspect 50% of the overhead circuits. The prioritization scheme for 2021 DIRS scope was designed to ensure high-risk structures are inspected first based on the Technosylva model. The recorded and projected areas included in the geodatabase are based on the methodology described above.	Section 7.3.4.4
4	IN-4	Infrared Inspection, Corona Scanning, and High Definition imagery of energized overhead Transmission facilities and equipment	For 2021 scope, SCE used the Technosylva consequence scores and the POI scores to select the highest risk transmission circuit miles in and adjacent to its HFRA. The final projected scope and prioritization may be adjusted based on operating constraints including but not limited to circuit loading and ambient temperature. The recorded and projected areas included in the geodatabase are based on this risk-ranking sequenced by the highest risk circuits and operational constraints such as weather, e.g., because high ambient temperature can make it difficult to detect temperature differentials, inspections are scheduled and performed during cooler days of the year.	Section 7.3.4.5
5	IN-5	Generation Inspections and Remediations	In 2020, SCE adopted a two-year cycle (2020-2021) where 50% of the assets targeted for inspections in 2020 were higher priority facilities in Tier 3 HFRA. Operational efficiencies and constraints are factored into the scheduling and execution of the work 2021 scope is based on the remaining targeted assets in Tier 2 and Tier 3. Additionally, prior to the typical start of the 2021 fire season, SCE has identified Areas of Concern (AOCs) in its HFRA, primarily driven by elevated dry fuel levels that pose increased fuel-driven and wind-driven fire risk. This threat is magnified during periods of high wind, high temperatures and low humidity. In order to mitigate emergent risk, SCE is accelerating inspections, remediation and vegetation trimming (and potentially identifying new inspections) in the identified AOCs. The methodology to identify AOCs is based on several factors including fire history, weather conditions, fuel type, exposure to wind, egress, etc. The methodologies described above were used to target the recorded and projected areas provided in the geodatabase.	Section 7.3.4.9.2

#	Initiative ID	Initiative / Activity	Analysis that Led to Target Specific Area	Cite to 2021 WMP Update
6	VM-1	Hazard Tree Management Program	SCE determines the trees to mitigate based on a two-step process, first selecting higher risk locations and then selecting higher risk trees within these locations. SCE prioritized higher risk locations based on HFRA tier, Tree Caused Circuit Outages (TCCI), and density of vegetation surrounding SCE's facilities, combined with REAX consequence scores. SCE also takes into account operational constraints such as permitting, access and weather conditions in scheduling and executing work. Hazard Trees may also be mitigated as a result of the AOCs described above. These methodologies were used for the recorded and projected areas included in the geodatabase.	Section 7.3.5.16.1
7	VM-2	Expanded Pole Brushing	The recorded and projected areas included in the geodatabase are based on a geographical grid approach and prioritizing poles subject to PRC 4292 taking into account operational efficiencies and constraints.	Section 7.3.5.5.1
8	VM-3	Expanded Clearances for Legacy Facilities	2021 scope considers the HFRA tier level, voltage levels and existing vegetation buffer was utilized to risk rank the locations. The approach combined desktop review and field visits. Tier 3 locations, facilities with higher voltage levels and areas with less existing vegetation buffer were considered higher risk. SCE also takes into account operational constraints such as permitting, access and weather conditions in scheduling and executing work. Expanded clearances may also be mitigated as a result of the AOCs described above. The methodologies described above were used for the recorded and projected areas included in the geodatabase.	Section 7.3.5.5.2
9	VM-4	Dead and Dying Tree Removal	Dead and Dying Tree Removal and associated mitigations cover SCE's full HFRA each year. SCE schedules and executes this work based on operational and resource efficiency and constraints. SCE does prioritize and mitigate hazards posed by dead trees or those that are identified as significantly compromised upon brief visual inspection taking into account constraints such as permitting, access and weather conditions. This methodology was used for the recorded and projected areas included in the geodatabase.	Section 7.3.5.16.2
10	SH-1	Covered Conductor	Beginning in 2019, SCE used the risk scores from the WRM to scope and prioritize the circuit segments for replacing bare conductor with covered conductor. The underlying Potential of Ignition (POI) and consequence score models have undergone several refinements and SCE continues to incorporate these enhanced risk scores into its deployment strategy to the extent practicable. In late 2020, SCE transitioned from using the Reax ignition consequence model to Technosylva and although this refined risk modeling primarily affects 2020 covered conductor scope and beyond it has resulted in some reprioritization of the 2021 circuit-segments. Additionally, the PSPS Action Plan may further reprioritize covered conductor scope over the projected period. In scheduling and executing covered conductor, SCE also considers other factors such as permit requirements, environmental constraints, outages and crew efficiencies. This methodology was used for the recorded and projected areas included in the geodatabase.	Section 7.3.3.3.1
11	SH-6	Circuit Breaker Relay Hardware for Fast Curve	The program identified electrical circuits in HFRA that had old mechanical relays or could reduce risk through relay upgrades and/or fast curve settings. While scoping the projects via job walks and desk top reviews, the locations were evaluated for scope complexity and grouped accordingly. To facilitate successful execution and provide the greatest opportunity for the fastest and most impactful risk reduction, the group of projects with multiple relays and least complexity was released first and largely completed in previous years. 2021-2020 scope focuses on relays that require extensive engineering or that have operational considerations. Prioritization is based on construction and scheduling feasibility rather than region. This methodology was used for the recorded and projected areas included in the geodatabase.	Section 7.3.3.2
12	SH-8	Transmission Open Phase Detection	The Transmission Open Phase Detection (TOPD) effort targets Transmission lines in HFRA. To minimize the complexity, we targeted lines with two terminals and single conductor (wire) per phase. The Transmission lines selected were within a geographical area to avoid impacting multiple locations across SCE's service territory. Pilot locations also needed to have existing Protection devices (Relays) with the ability to harness open phase detection settings/logic files as developed. Finally, engineering judgement and knowledge of existing relay schemes was used to identify the locations for 2021. This methodology was used for the recorded and projected areas included in the geodatabase.	Section 7.3.3.17.1
13	SH-10	Tree Attachment Remediation	The recorded and projected areas included in the geodatabase were prioritized based on Reax risk scores, conductor type, and tree mortality.	Section 7.3.3.3.2
14	SH-11	Legacy Facilities	The recorded and projected areas included in the geodatabase are based on Reax consequence scores of the closest available overhead structure along with the legacy asset's age, last major overhaul date, and operating voltage. Other factors (e.g., unique asset characteristics, HFRA Tier, years since last assessment).	Section 7.3.3.17.2
15	SH-13	C-Hooks Insulator Attachment Hardware Replacements	The recorded and projected areas included in the geodatabase are based on cumulative risk scores at the circuit level, driven by structure POI scores and fire consequence scores from Technosylva.	Section 7.3.3.15.1
16	SH-14	Long Span Initiative Remediation	SCE used risk-ranking from the WRRM to prioritize long span mitigations in all HFRA tiers based on the type of span issue and risk score. The highest risk locations are prioritized by using the probability of the issue leading to an ignition and the fire consequence score (e.g., Reax/Technosylva).	Section 7.3.3.12.1
17	SH-15	Vertical Switches	SCE the following factors in prioritizing replacement of vertical distribution switches: 1) an appropriate switch design form factor is available for the specific location, 2) equipment condition based on prior inspection findings, 3) the location's Technosylva risk score, and 4) the geographical proximity with other switch replacements.	Section 7.3.3.17.3