

OFFICE OF ENERGY INFRASTRUCTURE SAFETY

SECOND REVISED DRAFT 10-YEAR ELECTRICAL UNDERGROUNDING PLAN GUIDELINES

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1. Executive Summary

This document sets forth the Office of Energy Infrastructure Safety's (Energy Safety's) 10-Year Electrical Undergrounding Plan (EUP) Guidelines pursuant to Public Utilities Code section 8388.5.

1.1 Authority

Energy Safety has authority under Government Code section 15475.6 to "adopt guidelines setting forth the requirements, format, timing, and any other matters required to exercise its powers, perform its duties, and meet its responsibilities described in sections 326, 326.1, and 326.2 and Chapter 6 (commencing with section 8385) of Division 4.1 of the Public Utilities Code."

1.2 Purpose and Scope

Pursuant to Public Utilities Code section 8388.5,[1] a Large Electrical Corporation can prepare and submit a 10-year plan for undergrounding electrical distribution infrastructure to Energy Safety for review and approval. The plan must satisfy the requirements of section 8388.5(d)(2) and contain all required components.

These EUP Guidelines (Guidelines) set forth substantive and procedural requirements for Large Electrical Corporations[2] to prepare and submit plans. The Guidelines apply to Large Electrical Corporations in the State of California.

[1] All statutory references are to the Public Utilities Code unless otherwise specified.

[2] Per statute, a Large Electrical Corporation refers to an electrical corporation with at least 250,000 customer accounts. Section 8388.5(b) limits participation in the program to these entities.

2. Technical Guidelines

2.1 Overview of Electrical Undergrounding Plan (EUP) Required Elements

The elements of the EUP are described in the following sections of these Guidelines:

a. **Basic Information** on the Large Electrical Corporation, as described in Section 2.2 of these Guidelines.

b. **Demonstration of Substantial Risk Reduction**, including a Plan Mitigation Objective[3] and supporting Plan Tracking Objectives and targets, as described in Section 2.3 of these Guidelines.

c. The **Project Acceptance Framework** that the Large Electrical Corporation will use to create the list of Undergrounding Projects included in the EUP and to maintain the list of Undergrounding Projects throughout the EUP 10-year period, as outlined in Section 2.4 of these Guidelines.

d. **Project Timelines, Workforce Development Plan, Costs and Benefits, and Nonratepayer Funding Sources** that fulfill other statutory requirements, as described in Section 2.5 of these Guidelines.

e. **EUP Progress Report 0**, which includes the initial list of Undergrounding Projects and required data reporting, as described in Section 2.6 of these Guidelines.

f. Narrative description of the Large Electrical Corporation's **Risk Modeling Methodology** and decision-making metrics, as described in Section 2.7 of these Guidelines.

g. **Reporting Metrics**, including Project-Level, Portfolio-Level, and System-Level reporting requirements, as described in Section 2.8 of these Guidelines.

2.2 Basic Information

The EUP must include basic information about the Large Electrical Corporation, including, but not limited to:

a. The legal name of the Large Electrical Corporation.

[3] "Plan Mitigation Objective" means the amount of change in risk (wildfire and reliability) that is necessary to meet the substantiality requirements of section 8388.5(d)(2). See Appendix A (Definitions) for a complete list of defined terms.

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b. The number of customer accounts to show qualification as a Large Electrical Corporation.

c. A list of the persons responsible for preparing the EUP, including executive-level owner with overall responsibility; program owners with responsibility for specific components; and the primary contact for Energy Safety and stakeholder general questions. Include names, titles, areas of responsibility, and contact information.

2.3 Demonstration of Substantial Risk Reduction

Pursuant to section 8388.5(d)(2), the EUP can only be approved if it will (1) "substantially increase electrical reliability by reducing the use of public safety power shutoffs, enhanced powerline safety settings, deenergization events, and any other outage programs," and (2) "substantially reduce the risk of wildfire." To support this, the EUP must include the Plan Mitigation Objective, Plan Tracking Objectives, and other specific tracking objectives and targets as described below.

2.3.1 Plan Mitigation Objective

The Plan Mitigation Objective is the total amount of change in risk (wildfire and reliability) that is necessary to meet the requirement of section 8388.5(d)(2). This change in risk must account for only the reduction due to Undergrounding Projects (see Core Capabilities Section 2.7.5) and be measured on a *pro rata* basis.

The Large Electrical Corporation must set a Plan Mitigation Objective for the EUP and provide a supporting narrative and data in the EUP demonstrating how the EUP will achieve the Plan Mitigation Objective. In order to achieve the Plan Mitigation Objective, the Large Electrical Corporation will select projects (consisting of individual isolatable Circuit Segments) during the 10-year EUP.

The narrative must address the following:

a. Explanation of the basis of the Plan Mitigation Objective.

b. The source for the risk and reliability scores used to set the Plan Mitigation Objective.

c. Minimum levels of Ignition Risk and Outage Program Risk reduction as set forth in the Portfolio-Level Standards.

d. Overview of the implementation approach for the EUP (e.g., to reduce risk on the highest risk Circuit Segments first, or to select the most feasible for Undergrounding first) and an explanation of how the implementation approach will achieve the Plan Mitigation Objective.

e. An overview of how the Project Acceptance Framework, project timelines, plan for workforce development, nonratepayer funding, Progress Report 0, Risk Modeling,

and Reporting Metrics all support the Plan Mitigation Objective (see Sections 2.4 – 2.8 of these Guidelines).

f. A concise summary and clear presentation of the metrics and standards for the Portfolio of Undergrounding Projects and supporting Project-Level metrics. Instructions for developing and calculating these metrics are found in the Risk Modeling Section 2.7 of these Guidelines.

g. A summary of how Undergrounding Projects with multiple Subprojects (including any non-undergrounding Subprojects) will be reported and how the amount of risk reduced by these Undergrounding Projects will be allocated between the EUP Undergrounding Subprojects and non-undergrounding Subprojects as described in Section 2.7.5 of these Guidelines. In this section of the narrative, the Large Electrical Corporation must provide:

   i. A description of how the Project-Level Standard is evaluated in a manner which includes the effects of both Undergrounding Subprojects and non-undergrounding Subprojects.

   ii. A description of how Portfolio-Level metrics disaggregate the effects of non-undergrounding Subprojects for the measurement of the Plan Tracking Objectives and the Plan Mitigation Objective.

   iii. A description of how System-Level metrics disaggregate the effects of non-undergrounding Subprojects and any system hardening work on non-Portfolio Circuits for the measurement of the Plan Tracking Objectives and the Plan Mitigation Objective.

h. Explanatory graphs and figures.

i. Specific citations to any other EUP content that supports the Plan Mitigation Objective.

j. A Target/Timeline Table with the following information about the timelines for completion, unit cost targets, mileage targets, anticipated start and end dates, risk reduction, and cost targets for each year of the EUP. Ignition Risk and Outage Program Risk must be reported as described in Section 2.8.5.1. The information must be in table format in the EUP narrative and included as an Excel workbook.

   i. Year of EUP;

   ii. Dates for year of EUP;

   iii. Underground mileage completion targets (per year and cumulative);

   iv. Miles of overhead line deenergized;

   v. Miles of Undergrounding in the Project Planning and Construction Phases;

   vi. Unit cost targets for each year covered by the EUP;

   vii. Risk reduction in instantaneous Ignition Risk for risk at year 10;

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viii. Cumulative Ignition Risk reduction[4] anticipated at the end of the expected lifetime (defined as 55 years) of the infrastructure;

ix. Increase in instantaneous Outage Program Risk reliability for risk at year 10; and

x. Cumulative Outage Program Risk reduction[5] anticipated at the at the end of the expected lifetime (defined as 55 years) of the infrastructure.

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[4] The cumulative Ignition Risk reduction is defined as the difference between the cumulative collective Ignition Risk and Baseline cumulative Ignition Risk, measured at the System-Level, as detailed in Section 2.7.3 of these Guidelines.

[5] The cumulative Outage Program Risk reduction is defined as the difference between the cumulative collective Outage Program Risk and Baseline cumulative Outage Program Risk, measured at the System-Level, as detailed in Section 2.7.3 of these Guidelines.

The table below is an example of a Target/Timeline Table.

Table 1. Target/Timeline Table (example)

Year	Start Date	Miles Completed	OH Miles Deenergized	Cumulative Miles Completed	Preconstruction Miles	Unit Cost Target	Change in Instantaneous Wildfire Risk at Year 10	Change in Cumulative Wildfire Fire Risk over 55 years	Change in Instantaneous Outage Program Risk in Year 10	Change in Cumulative Outage Program Risk over 55 years
1	January 1, 2026									
2	January 1, 2027									
3	January 1, 2028									
4	January 1, 2029									
5	January 1, 2030									
6	January 1, 2031									
7	January 1, 2032									

Year	Start Date	Miles Completed	OH Miles Deenergized	Cumulative Miles Completed	Preconstruction Miles	Unit Cost Target	Change in Instantaneous Wildfire Risk at Year 10	Change in Cumulative Wildfire Fire Risk over 55 years	Change in Instantaneous Outage Program Risk in Year 10	Change in Cumulative Outage Program Risk over 55 years
8	January 1, 2033									
9	January 1, 2034									
10	January 1, 2035									
Final	December 31, 2035									

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2.3.2 Plan Tracking Objectives

To track and evaluate progress toward the Plan Mitigation Objective, the EUP must also include specific Plan Tracking Objectives. The Plan Tracking Objectives will be used to assess how the Portfolio of projects develops over time and whether the Large Electrical Corporation is on track to meet the Plan Mitigation Objective. The Plan Tracking Objectives must consist of forward-looking, quantifiable measurements and objectives, measured at the Portfolio-Level and System-Level, that will be used to assess progress toward the Plan Mitigation Objective.

The list of Plan Tracking Objectives must:

a. Be specific, measurable, achievable, realistic, and timely outcomes for the EUP.
b. Include annual and 5-year tracking objectives.
c. Include tracking objectives based on total Overall Utility Risk Reduction.
d. Include some tracking objectives based solely on Ignition Risk Reduction and some based solely on Outage Program Risk.
e. Include tracking objectives measured by risk reduced per mile.
f. Include tracking objectives measured in miles of overhead line deenergized.
g. Include tracking objectives measured in number of projects that have completed Screens 3 and 4.

The Independent Monitor[6] will use the Plan Tracking Objectives, and other EUP objectives to assess the Large Electrical Corporation's progress with implementation of its EUP. The Plan Tracking Objectives will be tracked in all Progress Reports pursuant to sections 8388.5(f)(3) and 8388.5(g).

The Plan Tracking Objectives are the Large Electrical Corporation’s current forecast plan for meeting the Plan Mitigation Objective. Each Progress Report must use performance metrics to compare and update the Plan Tracking Objectives. The Progress Report must explain the reasons for any changes to the Plan Tracking Objectives.

The EUP must contain a narrative setting forth the process the Large Electrical Corporation will use to compare and update Plan Tracking Objectives in each Progress Report.

[6] See Section 4.2 below for information on the Independent Monitor and additional guidelines related to compliance.

2.3.3 Risk Calculations for non-Undergrounding Subprojects

If the Undergrounding Project includes non-undergrounding Subprojects, the non-undergrounding work is counted as follows:

a. **Project Threshold** (see Sections 2.4.3.2 and 2.7.5): for purposes of determining if the Circuit Segment meets a Project Threshold, use the risk score for the entire Circuit Segment (including any potential non-undergrounding Subprojects).
b. **Plan Mitigation Objective and Plan Tracking Objectives** (see Sections 2.3.1, 2.3.2 and 2.7.5): for purposes of determining progress towards and compliance with the Plan Mitigation Objective and Plan Tracking Objectives, only use the risk reduction attributed to the Undergrounding Subprojects.
c. **Comparative Metrics** (see Section 2.7.10): for purposes of comparative metrics, use the risk reduction for the entire Circuit Segment when determining whether the project meets the Project-Level Standard, but only apply the risk reduction attributed to the Undergrounding Subprojects towards the Plan Mitigation Objective.

2.3.4 Risk Calculations for Projects Extending Beyond a Confirmed Project Polygon

If the scope of a project changes to include sections outside of the Confirmed Project Polygon (see Sections 2.4.2.4 and C.4.2), risk for the project is counted as follows:

a. **Expansion outside of a Confirmed Project Polygon**: in the event that a portion of another Circuit Segment outside of the Confirmed Project Polygon is added to a project, use the risk reduction for the full (expanded) project for determining the contribution towards the Plan Mitigation Objective and use only the work inside the original Confirmed Project Polygon for determining whether the project meets the Project-Level Standard (see Section 2.7.9.2).

2.3.5 Risk Calculations for Projects in Wildfire Rebuild Areas

If the Circuit Segment is in a Wildfire Rebuild Area (see Section 2.4.3.1), risk for the Circuit Segment is calculated as follows:

a. **Project Threshold** (see Sections 2.4.3.2, 2.7.5 and Appendix C.1.10): The Pre-Wildfire distribution infrastructure and associated risk scores are used to determine if the Circuit Segment meets the Project Thresholds.

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b. **Screen 3 Comparisons** (see Sections 2.4.5 and 2.7.10): for purposes of the Screen 3 Comparative Metrics, the Pre-Wildfire distribution infrastructure and associated risk must be used as the comparison Baseline.
c. **Plan Mitigation Objective and Plan Tracking Objectives** (see Sections 2.3.1, 2.3.2 and 2.7.5): the risk reduction from a Wildfire Rebuild Area Undergrounding Project is compared to Pre-Wildfire distribution infrastructure and associated risk scores for purposes of determining progress towards the Plan Mitigation Objective and Plan Tracking Objectives.

2.4 Project Acceptance Framework

Pursuant to section 8388.5(c)(2), the Large Electrical Corporation must identify Undergrounding Projects in its EUP. The Project Acceptance Framework is a multi-step process that the Large Electrical Corporation must establish and use to determine which Circuit Segments can be considered Undergrounding Projects, and, if undergrounded, will substantially increase electrical reliability[7] and substantially reduce the risk of wildfire.

The Large Electrical Corporation must list all Circuit Segments[8] in its service territory (the "All Circuit Segment List"), apply the Project Acceptance Framework to that list, and include the results in the EUP as described below. The Large Electrical Corporation must demonstrate that projects successfully passing through the Project Acceptance Framework contribute to achieving the Plan Mitigation Objective.

The Project Acceptance Framework has four screens:

Screen 1: Circuit Segment Eligibility

Screen 2: Project Information and Alternative Mitigation Comparison

Screen 3: Project Risk Analysis

Screen 4: Project Prioritization and Finalization

[7] Increased reliability is measured through the reduction of the use of Public Safety Power Shutoffs, enhanced powerline safety settings, deenergization events, and any other outage programs, pursuant to section 8388.5(d)(2).

[8] For purposes of these Guidelines, "Circuit Segment" means an isolatable circuit segment.

2.4.1 Project Progression Through Screens

The Project Acceptance Framework has a procedure for progressing a Circuit Segment through the four screens:

Screen 1 Procedure. The EUP must apply Screen 1 (Circuit Segment Eligibility) to all Tier 2 or 3 High Fire Threat District (HFTD) and non-HFTD Circuit Segments and any Wildfire Rebuild Areas at the time of EUP filing. The Large Electrical Corporation must identify any Wildfire Rebuild Areas using the procedure described by the Large Electrical Corporation pursuant to Section 2.4.3.1 below. Circuit Segments that are not located in a Wildfire Rebuild Area or a Tier 2 or 3 HFTD ("Out of Area Circuit Segments") are eliminated in Screen 1. Each Circuit Segment that is located in a Wildfire Rebuild Area or a Tier 2 or 3 HFTD is then evaluated to determine if the Circuit Segment meets the risk score criteria for eligibility. In-Area Circuit Segments that meet the risk score criteria are "Eligible Circuit Segments" and proceed to Screen 2. In-Area Circuit Segments that do not meet the risk score criteria are "Ineligible Circuit Segments" and do not proceed to Screen 2.

Screen 2 Procedure. The EUP must apply Screen 2 (Project Information and Alternative Mitigation Comparison) to all Eligible Circuit Segments. Circuit Segments that pass Screen 2 are considered "Undergrounding Projects" and can proceed to Screen 3. These Undergrounding Projects constitute the list of Undergrounding Projects that must be identified in the EUP pursuant to section 8388.5(c)(2).

Screen 3 Procedure. The EUP must apply Screen 3 (Project Risk Analysis) to all Undergrounding Projects for which the Large Electrical Corporation has sufficient information. Projects that pass Screen 3 are reported as "Confirmed Projects."

Screen 3 must be applied to a Portfolio of at least 25 individual Undergrounding Projects at the time of EUP filing.

Screen 4 Procedure. The EUP must apply Screen 4 (Project Prioritization and Finalization) to all Confirmed Projects at the time of EUP filing. Projects that pass Screen 4 are "Prioritized Projects."

The Large Electrical Corporation must detail the implementation approach it will use for each screen. The general requirements of each screen, including the minimum data and information requirements, are further described in the Sections below.

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Figure 1 provides a high-level overview of the Project Acceptance Framework process.

Figure 1. Project Acceptance Framework Flowchart

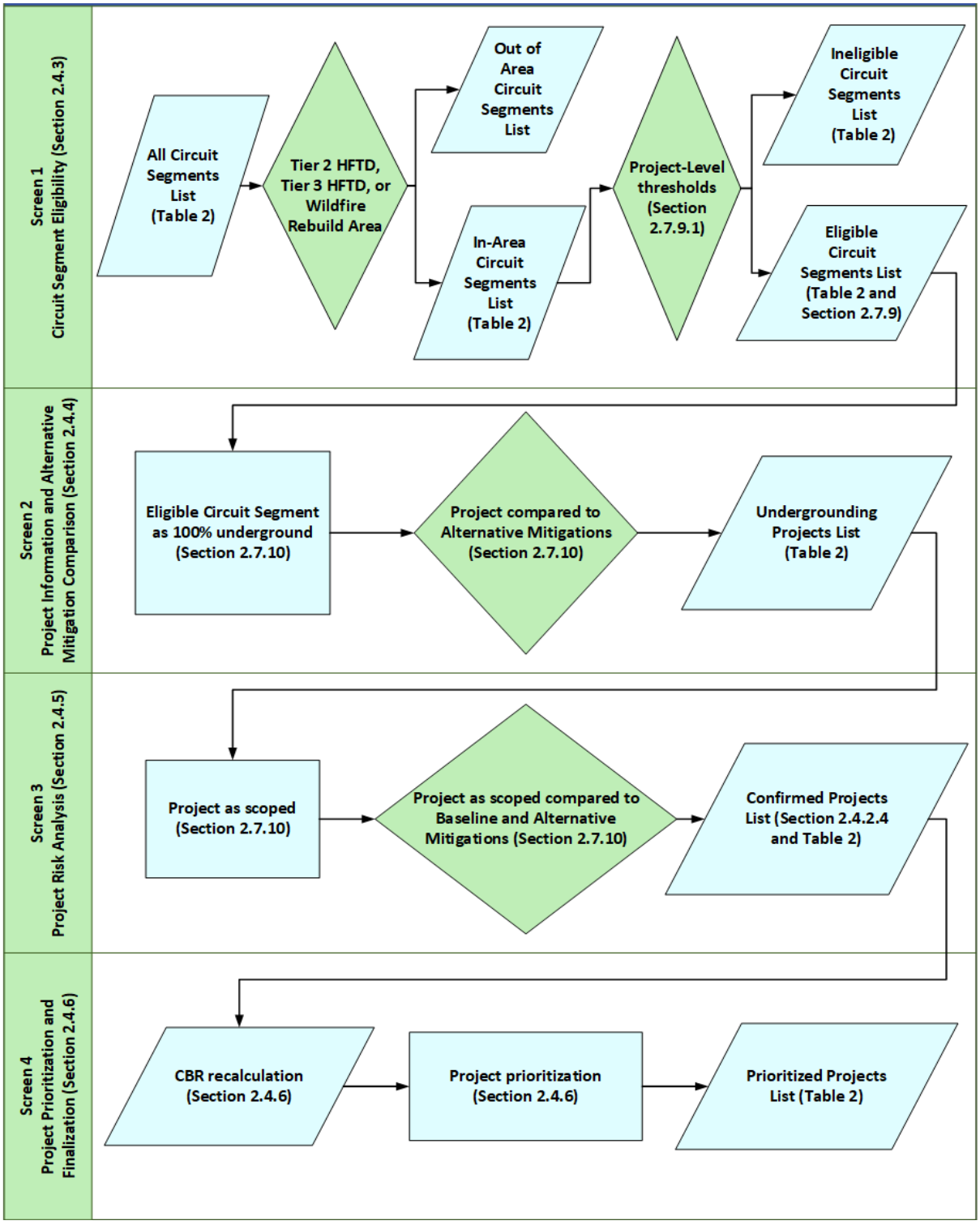


Figure 1 illustrates the Project Acceptance Framework process.

2.4.2 Incorporating Changes

2.4.2.1 Changes to Circuit Segment Information

After the EUP is filed, the Large Electrical Corporation must account for new information (such as project-specific information obtained through scoping and other project work), model version and calibration changes (such as those detailed in Section 2.7.5.2), and updates to HFTD maps or new Wildfire Rebuild Areas.

In each Progress Report, the list of Circuit Segments provided to Energy Safety, and associated risk scores, must be the same list and scores used at that time by the Large Electrical Corporation for risk modeling and decision-making. This list, at minimum, must include changes to risk scores through completion of Undergrounding Projects performed via the EUP, or any other wildfire mitigation activity.

Additionally, risk scores for each Circuit Segment must be updated to account for modeled effects of application of the EUP and other wildfire mitigation/hardening, until such time as a model calibration or version update takes place and assigns new risk scores directly.

If any changes occur on a Circuit Segment before it has passed Screen 3, then Screen 1 and Screen 2 must be reapplied. This could result in Circuit Segments being added or removed from the EUP. The Out-of-Area Circuit Segment list, In-Area Circuit Segment list, Eligible Circuit Segment list, Ineligible Circuit Segment list, and the list of Undergrounding Projects must all be updated. Information in the Screen 2 comparison must also be updated.

The EUP narrative must describe the process the Large Electrical Corporation will use to update this information in Progress Reports.

2.4.2.2 Subprojects

During the scoping process, the Large Electrical Corporation may divide an Eligible Circuit Segment into one or more Subprojects. Subprojects may be created for operational reasons, such as differences in expected completion times of portions of the undergrounding work (referred to as Undergrounding Subprojects). Subprojects may also be created to reflect that a portion of the Circuit Segment will be treated with a different wildfire mitigation (referred to as a non-undergrounding Subproject). If a Circuit Segment does not have multiple Subprojects during the scoping process, then it should be reported as a single Subproject.

The EUP narrative must include a detailed description of the decision-making process the Large Electrical Corporation will use to determine when to divide a Circuit Segment into Subprojects. This narrative must include a list of possible reasons for division, with a detailed explanation of each.

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2.4.2.3 Other Anticipated Changes

The Large Electrical Corporation must provide a narrative describing any other expected or known changes likely to occur and how those changes will be incorporated into the EUP.

2.4.2.4 Physical Changes to a Circuit Segment

The EUP must account for physical changes to a Circuit Segment such as relocating lines for operational reasons, the addition or removal of equipment that redefines the endpoints of a Circuit Segment, or changes in alignment due to undergrounding itself, among other factors. These changes are accounted for in three ways.

First, the Circuit Segments must be represented by unique identification names, which are unique both spatially and temporally, meaning a name cannot be reused for a "new" Circuit Segment. A Circuit Segment is considered "new" and requires a new Circuit Segment ID if equipment that defines the boundaries between Circuit Segments (e.g. circuit breakers and reclosers) are moved, removed, or added. See the introduction of Appendix C.1 for details.

Second, the evolution of Circuit Segments is tracked in the Circuit Segment Changelog table, linking the prior Circuit Segment ID to the new one (See Section C.1.7 of Appendix C).

Third, a Confirmed Project is defined by the boundaries of the Confirmed Project Polygon that encompasses the entire Circuit Segment on which the Undergrounding Project is defined. The Confirmed Project Polygon is fixed once the Circuit Segment becomes a Confirmed Project. Further details on the Confirmed Project Polygons are defined in Appendix C.4.2. Changes to proposed work on each Undergrounding Project do not need to be re-evaluated or passed through the screens again due to a physical change to the underlying Circuit Segment unless the work would take place outside the Confirmed Project Polygon, in which case additional justification will be required. Any Project or Subproject which has assets outside of the Confirmed Project Polygon must have a justification in the C.1.14 Subproject Table.

The EUP narrative must describe the process the Large Electrical Corporation will use to update this information in Progress Reports.

2.4.3 Screen 1: Circuit Segment Eligibility

Screen 1 (Circuit Segment Eligibility) is the procedure within the Project Acceptance Framework that identifies relevant Circuit Segments and creates the List of Eligible Circuit Segments.

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2.4.3.1 Identification of Circuit Segments Inside and Outside of Tier 2 or 3 High Fire-Threat Districts and Wildfire Rebuild Areas

In Screen 1, the Large Electrical Corporation must identify all Circuit Segments in its service territory (All Circuit Segments) and specify which Circuit Segments are located in a Wildfire Rebuild Area or Tier 2 or 3 High Fire-Threat District ("In-Area Circuit Segments"). If a Circuit Segment has portions both within and outside of a Tier 2 or 3 HFTD, each span crossing the Tier 2 or 3 HFTD boundary and up to two adjacent spans outside of a Tier 2 or 3 HFTD may be considered for undergrounding.

For each Circuit Segment, the following risk scores must be reported: Overall Utility Risk Score; Ignition Consequence Score; and Outage Program Likelihood Score. Section 2.7.9 of these Guidelines details the requirements for these risk scores. Additionally, each Circuit Segment must be identified by location, indicating whether the Circuit Segment is in a Tier 2 or 3 High Fire-Threat District; in a Wildfire Rebuild Area; or not located in either a Tier 2 or 3 HFTD or a Wildfire Rebuild Area. Appendix C.1.6, Circuit Segment Identification Table, and C.1.8, Circuit Segment Risk Score Table, give instructions for the type of information required in Screen 1.

The EUP narrative must describe the process the Large Electrical Corporation will use to identify Wildfire Rebuild Areas and the corresponding affected Circuit Segments. The Large Electrical Corporation must include a narrative in the Progress Reports describing identified Wildfire Rebuild Areas and providing information on the wildfire date, time, location, affected Circuit Segments and facilities impacted. The narrative must indicate if any distribution infrastructure damaged in the wildfire has already been rebuilt. Only Circuit Segments that have been damaged by wildfire and have not previously been rebuilt are eligible.

The EUP must include the following information in the EUP narrative or an additional table:

a. The total number of Circuit Segments within the Large Electrical Corporation service territory;
b. The total number of Circuit Segments located within a Tier 2 or 3 HFTD;
c. The total number of Circuit Segments located within a Wildfire Rebuild Area; and
d. The total mileage of lines in all Circuit Segments in each of the above groups.

In the EUP narrative, the Large Electrical Corporation must create three lists of In-Area Circuit Segments sorted in descending order by:

a. Overall Utility Risk Score;
b. Ignition Consequence Score; and
c. Outage Program Likelihood Score.

Each list should be shown as a table with only the top 20 highest scoring Circuit Segments, containing all three risk scores, the county where the Circuit Segment is located, and the Tier 2 or 3 HFTD Tier or Wildfire Rebuild Area that applies to the Circuit Segment.

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2.4.3.2 Identification of Risky Circuit Segments and Mitigation Standards

Screen 1 (Circuit Segment Eligibility) ensures that the EUP limits eligibility to higher risk Circuit Segments.

In the description of the Project Acceptance Framework, the EUP must present Project-Level Thresholds that establish the need for risk mitigation. Additionally, the Large Electrical Corporation must present Project-Level Standards that define a successful mitigation. Additional information on the required Project-Level Thresholds and Standards is provided in Section 2.7.9 of these Guidelines. The Project-Level Thresholds and Standards to be applied to Circuit Segments are:

1. **Eligible Circuit Segment Thresholds**: the minimum risk score thresholds that will be used to identify Circuit Segments that are eligible for the 10-Year EUP. These thresholds are the High-Risk Threshold, Ignition Tail Risk Threshold, and High Frequency Outage Program Threshold. They are further detailed in 2.7.9.1. In-Area Circuit Segments that do not meet any of these thresholds are called Ineligible Circuit Segments.

2. **Mitigated Circuit Segment Standards**: the Project-Level risk score that an Eligible Circuit Segment must reach to be considered sufficiently mitigated under the terms of the EUP.[9] These standards are the High-Risk Project Level Standard, the Ignition Tail Risk Project-Level Standard, and the High Frequency Outage Program Project-Level Standard. They are further detailed in 2.7.9.2.

After determining these Project-Level Thresholds and Standards, the Large Electrical Corporation must evaluate the list of In-Area Circuit Segments to determine eligibility and minimum mitigation needs.

The following must be included in the narrative portion of the EUP:

a. The Project-Level Thresholds and Standards;
b. The total number of In-Area Circuit Segments;
c. The number of Eligible Circuit Segments, by category; and
d. The number of In-Area Circuit Segments that are below the eligibility thresholds (Ineligible Circuit Segments).

[9] A Mitigated Circuit Segment is an Eligible Circuit Segment that has been treated to mitigate risk to the required standard described in Section 2.7.9.2 (High Risk Project-Level Standard, High Frequency Outage Program Project-Level Standard, Tail Risk Project-Level Standard).

2.4.4 Screen 2: Project Information and Alternative Mitigation Comparison

Screen 2 (Project Information and Alternative Mitigation Comparison) confirms there is sufficient information available on a Circuit Segment and requires comparison of undergrounding to Alternative Mitigations in order to determine which Eligible Circuit Segments can be treated as Undergrounding Projects.

For Screen 2, the Large Electrical Corporation must conduct an analysis comparing undergrounding to Alternative Mitigations and provide the California Public Utilities Commission (CPUC) Cost Benefit Ratio (CBR) and all information in the CPUC Data Appendix 1[10] at the time the EUP is submitted to Energy Safety. The Alternative Mitigation Comparison must include a comparison of the project to at least two Alternative Mitigations as detailed in Section 2.7.10.

2.4.4.1 Common Set of Values and Assumptions

Screen 2 (Project Information and Alternative Mitigation Comparison) may use common values and assumptions to develop estimates for Circuit Segments when project-specific information is not available. Screen 2 includes calculation of risk and benefit scores; it applies to both undergrounding and Alternative Mitigations. The EUP must include a narrative summarizing the assumptions underlying the values and explaining the metrics used in Screen 2. This narrative summary must be clear, concise, and comprehensive. At a minimum, this summary must include:

a. A description of the metrics required by the CPUC Guidelines for the SB 884 Program.
b. Detailed description of mitigations that the Large Electrical Corporation will use for these comparisons. Explanation of why these Alternative Mitigations are being considered. Description of the process and criteria that the Large Electrical Corporation will use for determining the best Alternative Mitigations for individual project comparisons. Description of the process for identifying and evaluating new mitigation technologies through the life of the EUP. Description of processes and resources that will be used for deploying each Alternative Mitigation.
c. Description of any assumptions for scope, cost, extent, and wildfire risk reduction and reliability improvements that are applicable to multiple Undergrounding Projects. These descriptions must be provided for all activities (undergrounding and Alternative Mitigations).

[10] CPUC Resolution SPD-15 (March 7, 2024), SB 884 Program: CPUC Guidelines, Appendix 1: SB 884 Project List Data Requirements-Preliminary https://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=526984185.

d. Explanation of how the need for additional easements, permits, and CEQA review are accounted for in the assumptions for scope, cost, extent, and risk reduction and reliability improvements.

2.4.5 Screen 3: Project Risk Analysis

2.4.5.1 Screen 3 Procedure

Screen 3 (Project Risk Analysis) is the procedure for evaluating an individual Undergrounding Project in the context of the Portfolio of Undergrounding Projects and includes information obtained through the project development process. Screen 3 considers the expected wildfire risk reduction and reliability increase elements of the Plan Mitigation Objective of an Undergrounding Project and includes comparing risk metrics for undergrounding and Alternative Mitigations.

Screen 3 must be completed for each Undergrounding Project when the Large Electrical Corporation has sufficient information to fulfill the modeling requirements in Section 2.7 for that Undergrounding Project. Appendix C.1.12, Screen 3 Table, and C.1.15, Project Index Table, give instructions for the type of information required for Screen 3.

The EUP must contain a narrative detailing how the Large Electrical Corporation will use Screen 3 on individual Undergrounding Projects and describe the typical scoping process. The narrative must include the Screen 3 procedure for selecting Alternative Mitigations consistent with the instructions on Alternative Mitigation selection in Section 2.7.10. The narrative must include a description of how project-specific information will be incorporated into the selection of Alternative Mitigations. The narrative must include a description of how Baseline values will be determined per Section 2.7.5, Core Capability 6. The narrative must describe how the scoping process will be used to determine what portions of an Eligible Circuit Segment will be undergrounded.

For each Undergrounding Project with Subprojects, Appendix C.1.14, Subproject Table, requires the mitigation for each Subproject and a narrative with the reason for dividing the Circuit Segment into Subprojects (using the Subproject process required by Section 2.4.2.2).

An Undergrounding Project that has completed Screen 3 can proceed to Screen 4. Undergrounding Projects that have completed Screen 3 are reported as Confirmed Projects in Progress Reports.

2.4.5.2 Twenty-Five Undergrounding Project Requirement

The filed EUP must include a Portfolio of at least 25 individual Undergrounding Projects considered under Screen 3. This Portfolio must include:

a. at least one Circuit with multiple Undergrounding Projects.
b. at least three Undergrounding Projects with multiple Subprojects (if Subprojects will be part of the EUP).

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c. at least three Undergrounding Projects with non-undergrounding Subprojects (if non-undergrounding Subprojects will be part of the EUP).
d. at least two Undergrounding Projects considered for the High Frequency Outage Program Threshold (if High Frequency Outage Program will be part of the EUP).
e. at least two Undergrounding Projects considered for the Ignition Tail Risk Threshold (if Ignition Tail Risk will be part of the EUP).

Additionally, the Large Electrical Corporation must present, in a separate section, an analysis of at least one Undergrounding Project which the Large Electrical Corporation does not plan on undergrounding due to factors that are captured in the Screen 2 and Screen 3 analysis. This analysis must be presented with narrative description and associated numerical tables in Progress Report 0, named "Example Rejected Portfolio".

2.4.6 Screen 4: Project Prioritization and Finalization

Pursuant to section 8388.5(c)(2), the EUP must include a means of prioritizing Undergrounding Projects based on "wildfire risk reduction, public safety, cost efficiency, and reliability benefits."

For Screen 4 (Project Prioritization and Finalization), the EUP must set forth a means of prioritization and its definition for each of the factors in section 8388.5(c)(2), i.e., wildfire risk reduction, public safety, cost efficiency and reliability benefits. If an Undergrounding Project is divided into Subprojects, the Large Electrical Corporation must consider the different completion times of Subprojects and the effect of staggered completion times, consistent with the timeline requirements in Section 2.7.5, Core Capabilities 4 and 5. Additionally, the costs, benefits, and CPUC CBR are calculated for the design variations that were used in Screen 3, including the "Screen 3 Alternative Mitigations," the "Project as Scoped," and the "Undergrounding as Scoped." Appendix C.1.13, Screen 4 Table, gives instructions for the type of information required in Screen 4.

In the context of this project prioritization, the Large Electrical Corporation may define reliability benefits to include benefits not related to Outage Program Events. The EUP must describe how the factors will be applied to set priority for Confirmed Projects. The EUP must describe how the prioritization aligns with and supports the Plan Mitigation Objective. The EUP must include a narrative of the Large Electrical Corporation's rationale and supporting data (e.g., KDMMs) for each definition and the means of prioritization included in Screen 4.

The EUP must include a list of Confirmed Projects with the Screen 4 prioritization applied.

2.4.7 Required Circuit Segment Information Lists

2.4.7.1 Instructions for Circuit Segment Information Lists

The Project Acceptance Framework uses a series of screens to evaluate Circuit Segments for the EUP.

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As seen in Figure 1, *Project Acceptance Framework Flowchart* and described above, each screen requires the Large Electrical Corporation to create and review progressively smaller sets of Circuit Segments which satisfy various criteria and have different levels of information determined, until they finally become Confirmed Projects and Prioritized Projects. The full lists of Circuit Segments which have reached these stages can be generated from the data submission tables described in Appendix C. Each Progress Report, beginning with Progress Report 0 (see Section 2.6), will include the data submission for these lists in a tabular format that can be accessed by members of the public.

The table below describes the lists utilized in the Project Acceptance Framework process, the relevant information they contain, and the tables that can be joined to generate the lists.

Table 2. Circuit Segment Information Lists

List Name	Description	Information Provided	Tables Containing Information
All Circuit Segments List	List of all Circuit Segments in service territory	• Unique Circuit IDs and Circuit Segment IDs • For each Circuit Segment, whether it is located in (i) a Tier 2 or 3 High Fire-Threat District or not in either; and/or (ii) a Wildfire Rebuild Area or not • Overall Utility Risk Score • Ignition Consequence Score • Outage Program Likelihood Score	Appendix C: C1.6 Circuit Segment Identification Table Appendix C: C1.8 Circuit Segment Risk Score Table
In-Area Circuit Segments List	List of all Circuit Segments in a Wildfire Rebuild Area or Tier 2 or 3 High Fire-Threat District (In-Area)	• Overall Utility Risk Score • Ignition Consequence Score • Outage Program Likelihood Score	Appendix C: C1.6 Circuit Segment Identification Table Appendix C: C1.8 Circuit Segment Risk Score Table

List Name	Description	Information Provided	Tables Containing Information
Eligible Circuit Segments List	List of all In-Area Circuit Segments that are above a Project-Level Threshold and therefore eligible for the EUP	• Project-Level Thresholds • Project-Level Standards • Project Variable Modifiers (see Section 2.7.7 of these Guidelines)	Appendix C: C1.1 Plan Table Appendix C: C1.6 Circuit Segment Identification Table Appendix C: C1.8 Circuit Segment Risk Score Table
Ineligible Circuit Segments List	List of all In-Area Circuit Segments that are below all Project-Level Thresholds and therefore are NOT eligible for the EUP	• Project-Level Thresholds • Project-Level Standards • Project Variable Modifiers (see Section 2.7.7 of these Guidelines)	Appendix C: C1.1 Plan Table Appendix C: C1.6 Circuit Segment Identification Table Appendix C: C1.8 Circuit Segment Risk Score Table
Undergrounding Projects List	List of all Eligible Circuit Segments that have been compared to multiple mitigation strategies using Cost Benefit Analysis data	• CPUC Data Appendix completed • CPUC CBR • Screen 2 Table	Appendix C: C1.1 Plan Table Appendix C: C1.11 Screen 2 Table Appendix C: C1.15 Project Index Table
Confirmed Projects List	List of Undergrounding Projects that have been compared to multiple	• Risk landscapes for separate, collective, and ablation studies • Screen 3 Table	Appendix C: C1.1 Plan Table Appendix C: C1.12 Screen 3 Table

List Name	Description	Information Provided	Tables Containing Information
	mitigation strategies using KDMM data		Appendix C: C1.15 Project Index Table
Prioritized Projects List	List of Confirmed Projects, with each project prioritized using section 8388.5(c)(2) prioritization	• List of Confirmed Projects sorted by priority • Planning and Construction Phase Status • Subproject Information	Appendix C: C.1.10 Project Table Appendix C: C.1.15 Project Index Table For more information on Subprojects, see Appendix C: C.1.14 Subproject Table
Non-EUP Projects List	See Section 2.4.7.2 of these Guidelines	See Section 2.4.7.2 of these Guidelines	Appendix C: C1.6 Circuit Segment Identification Table

2.4.7.2 Information on Non-EUP Projects

The EUP must include information on any distribution undergrounding or other system hardening project in a Tier 2 or 3 High Fire Threat District that is funded or in the Project Planning and Construction Phases that is not included in the 10-Year EUP ("Non-EUP Project"). The Large Electrical Corporation must include this information in the Circuit Segment Identification Table as described in Appendix C.1.6. The Large Electrical Corporation is not required to apply the screens to non-EUP Projects.

The Large Electrical Corporation must also provide a brief overview of all non-EUP Undergrounding programs and all other distribution system hardening programs aimed at reducing Ignition Risk and Outage Program Risk. The Large Electrical Corporation must include the timeline for completion of Non-EUP Projects, their Project Status, and their associated risk reduction. The overview must discuss how the selection process for these Non-EUP Projects and programs is different from the EUP and how they will be coordinated with the EUP.

All of the information above must be updated in each Progress Report. The Large Electrical Corporation must also include a narrative describing how these projects are accounted for in the Risk Modeling Methodology.

2.5 Project Timelines, Workforce Development Plan, Costs and Benefits, and Nonratepayer Funding Sources

The Timelines, Workforce Development, Costs and Benefits, and Nonratepayer Funding components are the plan components required by sections 8388.5(c)(3), (c)(5), (c)(6) and (j).

2.5.1 Project Timelines and Targets

Section 8388.5(c)(3) requires an EUP to include, "[t]imelines for the completion of identified and prioritized undergrounding projects, and unit cost targets and mileage completion targets for each year covered by the plan." To fulfill this component, the EUP must contain:

a. The Target/Timeline Table described in Section 2.3.1.
b. A project management template that will be used to track and communicate each project's schedule and milestones. The project management template should include dates for scoping, planning/design, permitting/dependencies, pre-construction, construction, and completion.
c. A description of controls that will be in place to ensure the schedules are maintained.

2.5.2 Workforce Development Plan

Section 8388.5(c)(5) requires the EUP to include a "plan for utility and contractor workforce development." To fulfill this component, the EUP must contain a description of how the Large Electrical Corporation will successfully secure the resources required to implement the EUP for the full 10 years. Some examples include:

a. A list of the job classifications;
b. Annual EUP workforce targets;
c. A description for workforce training, recruitment, and retention;
d. A description of constraints and strategy for addressing those constraints; and
e. A description of the potential impacts that EUP implementation could have on traditional safety and reliability related projects and programs that rely on the same field personnel.

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2.5.3 Costs and Benefits

Section 8388.5(c)(6) requires the EUP to include "an evaluation of project costs, projected economic benefits over the life of the assets, and any cost containment assumptions, including the economies of scale necessary to reduce wildfire risk and mitigation costs and establish a sustainable supply chain." To fulfill this component, the EUP must contain a narrative for each of the following:

a. Evaluation of project costs;
b. Projected economic benefits over the life of the assets;
c. Cost containment assumptions (including economies of scale necessary to reduce wildfire risk and mitigation costs); and
d. Strategies for achieving a sustainable supply chain and the economies of scale necessary to reduce costs over time.

2.5.4 Nonratepayer Funding Sources

Section 8388.5(j) requires the Large Electrical Corporation participating in the program to "apply for available federal, state, and other nonratepayer moneys throughout the duration of its approved undergrounding plan" and use acquired funds to reduce the program's costs to ratepayers. To fulfill this component, the EUP must contain:

a. List of existing nonratepayer funding opportunities;
b. A plan for identifying additional sources of nonratepayer funding and plans for tracking and applying for nonratepayer funding opportunities that may become available; and
c. A plan for tracking nonratepayer funds received to ensure the funds are used to reduce ratepayer costs.

2.6 Progress Report 0

The EUP must include a report called "Progress Report 0" as an attachment. Progress Report 0 must show the status of Circuit Segments and other matters related to wildfire mitigation at the time of EUP submission.

The Large Electrical Corporation must submit an updated Progress Report 0 every six months until the EUP start date including during the period the EUP is evaluated by Energy Safety and the CPUC. During this time period, Energy Safety may direct the Large Electrical Corporation to make changes to the format and content of Progress Report 0.

The EUP must contain a narrative explaining the Large Electrical Corporation's choice of content and structure for Progress Report 0. The narrative must explain and confirm how Progress Report 0 meets the requirements in Sections 2.6.1 and 2.6.2 below.

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2.6.1 Content of Progress Report 0

Progress Report 0 must be based on information and data available at the time of submission. The Circuit Segment Information Lists, including the Confirmed Projects List and the Prioritized Project List, submitted in Progress Report 0 must meet the minimum requirements described in Section 2.4.1 for Screen 3.

Progress Report 0 must, at a minimum, include the following sections:

a. Portfolio Coversheet (narrative);
b. Example Rejected Portfolio (see Section 2.4.5.2, Twenty-Five Undergrounding Project Requirement);
c. Plan Mitigation Objective (narrative);
d. Plan Tracking Objectives (narrative);
e. Target/Timeline Table (narrative);
f. Identified Wildfire Rebuild Areas (narrative);
g. Model Report (see Section 2.7.2);
h. Alternative Mitigation Selection Process (narrative);
i. All data required pursuant to Section 2.8 and Appendix C of these Guidelines; and
j. Any additional System-Level, Portfolio-Level and Project-Level information the Large Electrical Corporation would like to be included in Progress Reports.

2.6.2 Relation of Progress Report 0 to Statutory Progress Report Requirement

The content, format, and structure of Progress Report 0 will inform the requirements for future Progress Reports. Energy Safety may provide additional guidance regarding future Progress Report requirements at a later date.

2.7 Risk Modeling

This section describes the requirements for the Risk Modeling Methodology that the Large Electrical Corporation must employ to establish the Plan Mitigation Objective and to perform the analysis required in Screen 3 (Project Risk Analysis).

The Large Electrical Corporation must justify its methodology in a narrative section of its EUP submission. This narrative must be organized into the following sections.

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Table 3. Narrative Requirements Supporting Risk Modeling Methodology

Section Name	Narrative Requirements	Maximum Length of Narrative Section	Required Tables and Figures	Table Requirements
Overview	See 2.7.1	5 pages	Enterprise Diagram(s)	See 2.7.3.1
Model Report	See 2.7.2	4 pages per Sub-model	None	None
Core Capabilities	See 2.7.5	2 pages per Capability	None	None
Model Inputs	See 2.7.5.1	1 page per Input Category	Model Risk Landscape Variables Table	See 2.8.5.1
Project Variable Modifiers	See 2.7.6	1 page per Project Variable Modifier	Project Variable Modifiers Inputs Table Project Variable Modifiers Outputs Table	See 2.8.5.2
Calibration and Versioning	See 2.7.5.2	2 pages	None	None
Key Decision-Making Metrics	See 2.7.3	3 pages for required KDMMs and up to 1 page each for up to 5 additional KDMMs	None	None
Portfolio-Level Standards	See 2.7.8	2 pages	None	None

Section Name	Narrative Requirements	Maximum Length of Narrative Section	Required Tables and Figures	Table Requirements
Project-Level Thresholds	See 2.7.9.1	2 pages	None	None
Project-Level Standards	See 2.7.9.2	2 pages	None	None

2.7.1 Overview of Risk Modeling Methodolgy

The Large Electrical Corporation must provide an overview narrative that explains the key elements of its risk modeling approach and definitions. The narrative must detail how the Large Electrical Corporation will compare the potential wildfire risk and reliability impacts of Undergrounding to Alternative Mitigations. The overview must describe the methodology and underlying intent of the Large Electrical Corporation's risk assessment in no more than five pages, inclusive of all narratives, bullet point lists, and any graphics. The overview narrative should also include any additional Key Decision-Making Metrics (KDMMs) proposed by the Large Electrical Corporation and the enterprise diagram as required by Section 2.7.3 below.

2.7.2 Model Reports

The Large Electrical Corporation must present a Model Report consisting of a collection of report chapters on each individual model used in the Risk Modeling Methodology. A model is defined as a distinct part of the larger Risk Modeling Methodology that has explainable units. These distinctions must be at least as granular as in the enterprise diagram described in Section 2.7.3.1 of these Guidelines. At a minimum, these models must include an Ignition Likelihood model, an Ignition Consequence model, an Outage Program likelihood model, an Outage Program consequence model, and an overall utility risk model. For each model, the Large Electrical Corporation must describe the methodology and numerical calculations involved at a level of detail that would allow for verification and replication in a self-contained chapter. Each chapter of the Model Report must be no more than four pages, inclusive of all narratives, bullet point lists, and any graphics. A Model Report may reference additional, publicly available documents published by the Large Electrical Corporation or third-party vendors. Each Model Report must also attach a technical workbook as an appendix. The technical workbook must demonstrate the numerical calculations and contain the toy problems referenced below.

Each chapter of the Model Report must be formatted into the following subsections addressing different aspects of the modeling methodology and implementation.

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a. **Model Usage**: For each chapter, the Model Usage section must describe the model's scope, how often the model is utilized, what aspects of the electrical system's risk profile are evaluated by this model, and specifically identify what risk or risk component the model is evaluating.

b. **Model Type**: For each chapter, the Model Type section must describe the model's taxonomy (e.g., physics simulation, mathematical model, machine learning classification).

c. **Key Inputs**: For each chapter, the Key Inputs section must describe the data that is fed into a calibrated model, including a description of the original data collection when applicable.

d. **Model Solution**: For each chapter, the Model Solution section must describe the method used to calibrate, train, simulate, optimize, or implement the model from a mathematical standpoint. The model solution must include relevant information. For example:

    i. If the model is based on a historical frequency table, briefly describe the data procurement and weighting of the decision function.

    ii. If the model is based on a general linear model, Bayesian regression or other under-parameterized model, describe the training data and validation accuracy of the model.

    iii. If the model is based on solving a non-convex problem, briefly describe the optimization procedure and potential pitfalls of local minima.

    iv. If the model is based on an overparameterized network, briefly describe the optimization procedure, including the number of learnable parameters, training technique, and the size and origin of the training and testing sets.

    v. If the model is based on a physical simulation, describe the simulation evolution algorithm, spatial and temporal resolution, and any subgrid effects considered.

    vi. If the model is based on Monte Carlo simulations, describe the assumptions made to build the component distributions and the outcome uncertainties.

e. **Model Outputs**: For each chapter, the Model Outputs section must describe how the data produced by the model is fed into other models or used by the Large Electrical Corporation to make risk-related decisions. The Large Electrical Corporation must describe the mathematical type of output (e.g., distribution, average value, score, probability), the spatial resolution (e.g., per Circuit, per segment, per county) and temporal resolution (e.g., per day, per season, per year).

f. **Uncertainty**: For each chapter, the Uncertainty section must describe the amount by which a calculated value output by the model might differ from the actual value when the input parameters are known. Additionally, this section must address any methods the Large Electrical Corporation uses to account for missing input data in its Risk Modeling Methodology. Lastly, this section must address the sensitivity

analysis used to determine the relationships between the uncertainty in the inputs used in an analysis and the uncertainty in the resultant dependent variables due to numerical instability or stiffness of the underlying equations.

g. **Toy Problems**: For each chapter, the Toy Problems section must describe three examples, specifying input and output values, using synthetic data. One input must lead to a low-risk (or low-probability, low-consequence) output, one for a medium-risk case, and one for a high-risk case. In each case, the Large Electrical Corporation must describe the magnitude and units of the inputs and outputs as well as the prevalence of each scenario in real-world data. These examples must also be presented numerically in a workbook attached to the end of the Model Report.

h. **Shelf-life**: For each chapter, the Shelf-life section must describe the length or period the model is expected to be used. This section must describe if/how the model is expected to be updated, both regarding new calibration data and new project input data. This section must describe if/when the model is expected to be retired or replaced by an entirely new model. Sections 2.7.5.2 and 2.7.7 of these Guidelines detail further requirements for updating the Risk Modeling Methodology.

2.7.3 Key Decision-Making Metrics and Enterprise Diagrams

The Key Decision-Making Metrics (KDMMs) are defined to be the collection of top-level metrics that the Large Electrical Corporation proposes to use to evaluate the efficacy of an Undergrounding Project. These KDMMs are not influenced by risk attitudes, risk tolerances, opportunity costs or any other decision-making parameters. They do not reflect financial considerations and must be used alongside financialized metrics reported in Screen 2 and Screen 4 to evaluate projects. The KDMMs measure key elements of risk and can be substantiated by real-world observations.

The KDMMs will be used for approximating risk at the System-Level, Portfolio-Level, and individual Project-Level. A System-Level measurement accumulates information from the entire distribution system into a single number. A Portfolio-Level measurement accumulates information from every Circuit Segment on a Circuit which has one or more Confirmed Projects as well as their effects on the overall Circuit into a single number. A Project-Level measurement accumulates risk from all of the equipment on a single Circuit Segment.

The Large Electrical Corporation must include the seven mandatory KDMMs described below and has the option to include five additional KDMMs of its choosing.

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a. The Large Electrical Corporation must include the following KDMMs:
    i. **Overall Utility Risk:** A combined measure of Ignition Risk and Outage Program Risk that measures the total risk of wildfires and Outage Program Events related to wildfire risks. This is computed as the inner product of the likelihoods of adverse events and their consequences. This is an unweighted and unscaled calculation.
    ii. **Ignition Risk:** The measure of impacts from wildfire at a given location. This metric is the product of two factors: (1) the likelihood a wildfire will occur, and (2) the potential consequences of a wildfire originating from this location. This is an unweighted and unscaled calculation.
    iii. **Ignition Consequence:** The total anticipated adverse effects from a wildfire on each community it reaches. This metric considers the wildfire hazard intensity, the wildfire exposure potential, and the inherent wildfire vulnerabilities of communities at risk.
    iv. **Ignition Likelihood:** The likelihood of an ignition at a given location given a probabilistic set of environmental conditions.
    v. **Outage Program Risk:** The measure of reliability impacts from Outage Programs at a given location. This metric is the product of two factors: (1) the likelihood an Outage Program Event will be required due to environmental conditions exceeding design conditions, and (2) the potential consequences of the Outage Program for affected customers, considering exposure potential and vulnerability. This is an unweighted and unscaled calculation.
    vi. **Outage Program Consequence:** The total anticipated adverse effects from an Outage Program for a community. This considers the Outage Program exposure potential and inherent Outage Program vulnerabilities of communities at risk.
    vii. **Outage Program Likelihood:** The likelihood of an Outage Program being deployed at any given time, given a probabilistic set of environmental conditions. This measure should capture both the probability of an Outage Program Events(s) being initiated at given time and the length of time of those Outage Program Event(s).
b. Up to five additional KDMMs proposed by the Large Electrical Corporation may also be included. For each additional KDMM, the Large Electrical Corporation must include the following information in the Overview Section of the Risk Modeling Methodology:
    i. Provide a definition, numerical calculation, and units.
    ii. Explain each proposed KDMM, including how the KDMM contributes to measuring Ignition Risk and/or Outage Program Risk.

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iii. Report the proposed KDMMs at the same resolution and frequency as the required KDMMs.

2.7.3.1 Enterprise Diagram

The Large Electrical Corporation must provide one or more entity relation diagram(s) of the system(s) used for quantifying Ignition Risk and one or more entity relation diagram(s) of the system(s) used for quantifying Outage Program Risks.

Each diagram must show how input data feeds into independent sub-models and identify the KDMMs, and all precursor calculations used in generating each KDMM. A precursor calculation is an intermediate modeling value with explainable meaning that is computed from the input data and determined in the process of computing the KDMM. For example, an unscaled consequence score is considered a precursor calculation for a scaled risk score, but an intermediate activation value of a neural network is not considered a precursor. Similarly, if a risk score is normalized by distance (i.e. units of risk per mile), then the raw risk score is considered to be a precursor calculation.

An example of an enterprise diagram for Overall Utility Risk Model, which identities other KDMMs and precursor metrics, is presented below. All sub-models must be clearly labeled with their inputs and outputs classified intuitively. KDMMs and precursors must be identified by color and shown on the right-hand side of the diagram.

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Figure 3. Example Enterprise Diagram for Risk Modeling Methodology

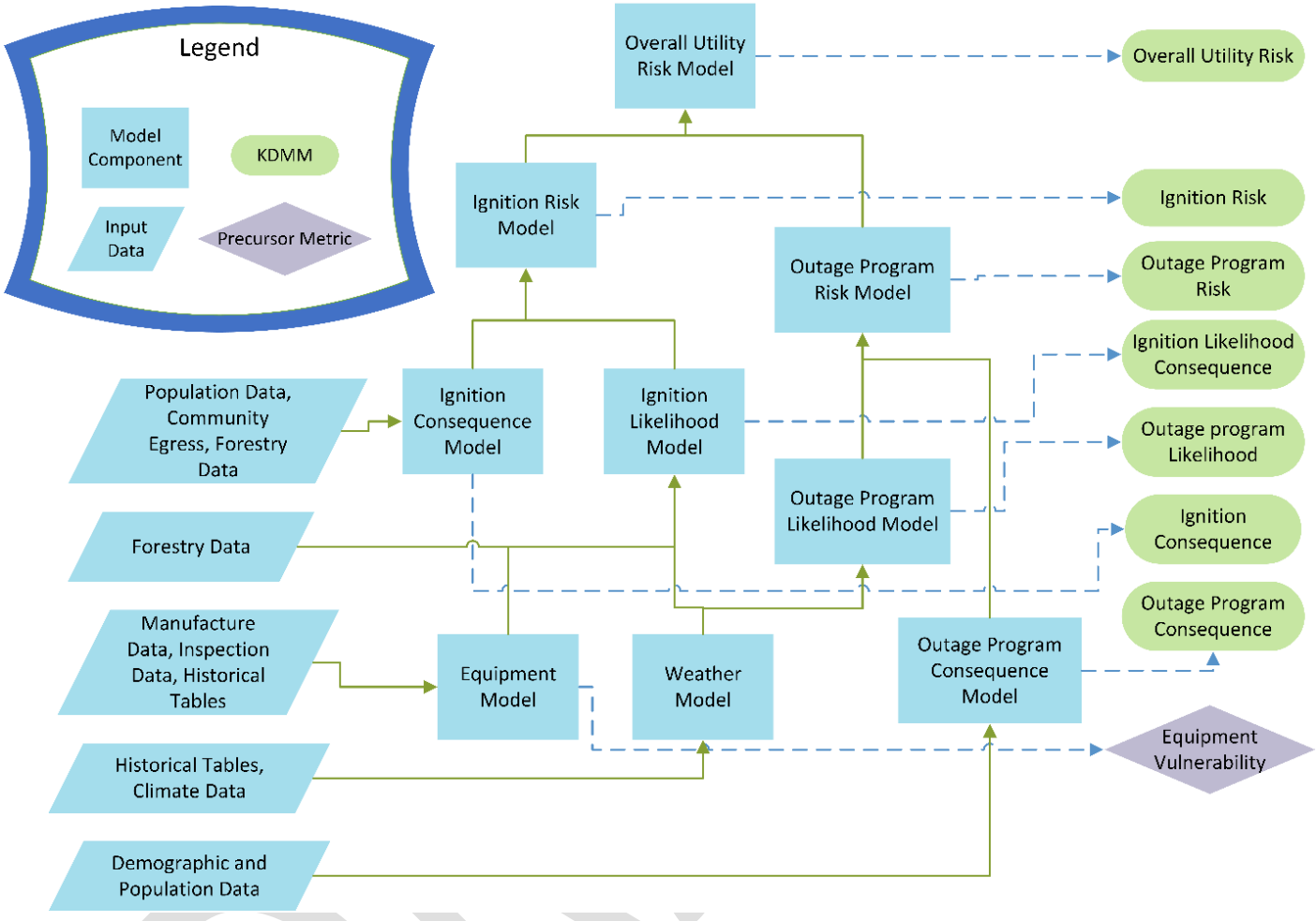


Figure 2 shows an example enterprise diagram with model inputs informing model components. The outputs are KDMMs and Precursor Metrics.

2.7.4 Model Risk Landscape

The Model Risk Landscape is the collection of all inputs, outputs and intermediate calculations used in the Risk Modeling Methodology. This includes all KDMMs, their precursor calculations, and any additional numerical evidence that the Large Electrical Corporation uses to evaluate or report the risk reduction of an Undergrounding Project or Alternative Mitigation. The Large Electrical Corporation must incorporate the elements of the Model Risk Landscape in its narrative supporting the Risk Modeling Methodology.

All claims involving the comparative risks of individual Undergrounding Projects must be substantiated by numerical comparisons between Model Risk Landscapes using the same version and calibration of the Risk Modeling Methodology.

A Model Risk Landscape is determined by these four elements:

1. The model version must indicate a unique configuration of the models as detailed in Section 2.7.5.2 of these Guidelines.
2. The calibration settings must uniquely identify the collection of non-project related input data fed into the models or used in historical tables.
3. The project list must refer to all projects that the model is considering in a specific evaluation for this measurement of Model Risk Landscape.
4. The forecast time must indicate what instantaneous time or accumulative period the model is evaluating.

2.7.5 Required Core Capabilities for Risk Modeling Methodology

Core Capabilities are defined as a set of required use-cases that the Large Electrical Corporation's Risk Modeling Methodology must be able to achieve to make quantitative arguments about the risk reduction of Undergrounding Projects and Alternative Mitigations. The Large Electrical Corporation must detail the formal quantitative procedure for achieving each of the following Core Capabilities:

a. Project-Level Risk Analysis;
b. Aggregate Risk Analysis;
c. Ignition Risk and Outage Program Risk as Separate and Collective Risks;
d. Approximating Future Risks and Accumulation of Ignition Risk and Electrical Reliability over Time;
e. Accounting for Undergrounding Projects with Multiple Mitigations and Subprojects;
f. Establishing Baselines and Historical Calibrations; and
g. Comparisons with Alternative Mitigation Strategies.

The Large Electrical Corporation must also list any additional workflows that are critical for evaluating the effectiveness and efficiency of its EUP.

For each capability, the Large Electrical Corporation must provide a narrative description, explicit formulas, and example calculations demonstrating how the capability is achieved. These example calculations may use synthetic inputs, but all formulas, input/output scaling and user parameters must be the same as those used in the Risk Modeling Methodology. The Large Electrical Corporation may include additional workbooks with the Model Report that demonstrate these calculations.

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Core Capability 1: Project-Level Risk Analysis

The Large Electrical Corporation must demonstrate that its framework can analyze risk reduction of projects in its Portfolio both separately and collectively. For each project, the Large Electrical Corporation must conduct a Collective Analysis, a Separate Analysis, and an Ablation Analysis. Each study will report these results at the Portfolio-Level and Project-Level.

a. The Collective Analysis describes the risk reduction of a single Undergrounding Project in combination with the rest of the Undergrounding Projects that are in the same Portfolio and details the effects of the specific Undergrounding Project on Circuit(s) as well as the entire system. It is reported for each Undergrounding Project at the Portfolio-Level and Project-Level.
b. The Separate Analysis measures the risk reduction of this Undergrounding Project if it was the only Undergrounding Project in the Portfolio and is reported at the Portfolio-Level and Project-Level.
c. The Ablation Study details the effects if this Undergrounding Project is NOT included in the Portfolio at both the Portfolio-Level and Project-Level.

The Large Electrical Corporation must provide examples of the computation in the narrative section of the EUP and explicitly state unit-conversion factors used to assess Project-Level risks.

Core Capability 2: Aggregate Risk Analysis

The Large Electrical Corporation must detail, in narrative form, its method for evaluating risk metrics at the Portfolio-Level and System-Level. For each KDMM, the Large Electrical Corporation must provide an explanation of its aggregation process. This narrative must include a description of the process the Large Electrical Corporation uses for the summation or aggregation of Circuit/Circuit Segment risks. This may include linear and/or non-linear processes if appropriately justified.

The Large Electrical Corporation must also demonstrate how it evaluates the effectiveness of multiple projects simultaneously for both Ignition Risk and Outage Program Risk.

Core Capability 3: Ignition Risk and Outage Program Risk as Separate and Collective Risks

The Large Electrical Corporation must detail its method for evaluating Ignition Risk and Outage Program Risk through separated and combined metrics. The Large Electrical Corporation must demonstrate its framework for performing separate and collective analysis of Ignition Risk reduction and reliability benefits from reduced Outage Program Risk. The Large Electrical Corporation must demonstrate that its analysis for each of these metrics can be performed both independently and collectively.

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The Large Electrical Corporation must additionally describe its method for balancing the trade-off between Ignition Risk and Outage Program Risk in its modeling. That is, the Large Electrical Corporation must explicitly define how it computes Overall Utility Risk as a factor of both Ignition Risk and Outage Program Risk and describe how each of these factors play a role in its process for selecting projects. The Large Electrical Corporation must explicitly state the value of any unit-conversion factors used in this computation and explain how they arrived at these value(s).

Lastly, the Large Electrical Corporation must describe the model gap between the modeled trade-off and the Large Electrical Corporation's real-world approach to limiting ignitions through Outage Programs. That is, the Large Electrical Corporation must describe how its modeled process differs from the real-world process used to intentionally deenergize lines during high-wind events (such as during a Public Safety Power Shutoff) and determine the use of fast trip settings.

Core Capability 4: Approximating Future Risks and Accumulation of Ignition Risk and Outage Program Risk over Time

The Large Electrical Corporation must detail its method for evaluating Ignition Risk and Outage Program Risk at future dates and the accumulation of Ignition Risk and Outage Program Risk over time. The Large Electrical Corporation must report instantaneous and cumulative risk and reliability scores at 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55 years into the future for all Confirmed Projects. Model Year 0 is defined to begin on the date the Large Electrical Corporation designates as the start date of the EUP (as set forth in the Target/Timeline Table), and subsequent times are measured at a fixed timeline from the same date.

The Large Electrical Corporation must describe how it uses estimated project timelines to model the reduction of risk and increase in reliability over time. For Undergrounding Projects, this timeline must include the estimated time for the project to acquire new rights-of-way, easements, permits, and CEQA review, if any. For non-undergrounding work, this timeline must use an estimate specific to the type of work using assumptions about the start time and construction time that are reasonable and consistent with the work being performed and assuming that the work will begin and be completed as soon as practicable. The Large Electrical Corporation must detail how these projections reflect its modeling of climate change as described in Core Capability 6.

If any discount rates are employed in the calculation of any KDMM, the Large Electrical Corporation must list them and explain their origin. If the discount rates change over time, the Large Electrical Corporation must explain how they change and why these changes are warranted. Changes must be in line with the CPUC Risk-based Decision-Making Framework Proceeding (Rulemaking 20-07-013 or its successor proceeding).

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Core Capability 5: Accounting for Undergrounding Projects with Multiple Mitigations and Subprojects

The Large Electrical Corporation must detail its method for evaluating Ignition Risk and Outage Program Risk for Undergrounding Projects that are completed in stages or have multiple mitigations on a single Circuit Segment. This description must contain explicit formulations and justification for any weighting employed in the computed risk reduction or allocation.

For Circuit Segments containing multiple mitigations (such as a portion of the Circuit Segment undergrounded, and another portion of the same Circuit Segment replaced with covered conductor), the Large Electrical Corporation must demonstrate how it models the risk-reduction of the overall project as well as how that risk reduction can be allocated between the different Subprojects. This must include an assessment of what equipment on the previously existing Circuit Segment will be removed, replaced, or refurbished at what a specific time as a part of a Subproject. In this assessment, each individual piece of equipment must be assigned to a single Subproject and cannot be assigned to multiple Subprojects. The Large Electrical Corporation must also comment on any modeling gap between their allocation scheme and the real word risk profile of the Circuit.

The Large Electrical Corporation must develop a projected timeline for completion of each Subproject and factor this into its overall Risk Modeling Methodology. Ignition Risk may only be reduced in the forecasted modeling after an overhead line is projected to be deenergized. Similarly, Outage Program Risk may only be forecasted to be reduced once the new line is projected to be energized. This requirement only directly applies to Screen 3 and Screen 4. Information on Subprojects in Screen 2 must be in accordance with the CPUC Risk-based Decision-Making Framework Proceeding (Rulemaking 20-07-013 or its successor proceeding).

Additionally, the Large Electrical Corporation must demonstrate a method to apportion overall risk reduced by an Undergrounding Project with multiple mitigations to the contribution from each mitigation type. For example, if the Large Electrical Corporation envisions a Confirmed Project with some portions of Undergrounding, covered conductor installation, and line-removal, it must be able to determine the overall risk reduction of the Confirmed Project and the amount of that overall risk reduction due to each of the Alternative Mitigation strategies. The apportionment methodology must be consistent across all Undergrounding Projects. The sum of risk reduced by each Subproject in a given Confirmed Project must equal the risk reduction of the Confirmed Project itself.

Core Capability 6: Establishing Baselines and Historical Calibrations

The Large Electrical Corporation must demonstrate how it ensures that the Risk Modeling Methodology is evaluated with up-to-date information that accurately reflects the Large Electrical Corporation's understanding of the risk on the system. Additionally, the Large Electrical Corporation must demonstrate that comparisons between Undergrounding Projects and Alternative Mitigations are made on a statistically consistent scale.

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To do this, the Large Electrical Corporation must develop a system to record Baselines and historical model calibrations. A new Baseline must be recorded by the Large Electrical Corporation at least once per calendar year. This new Baseline must account for all physical changes to the electrical distribution infrastructure performed during that year, through the EUP or any other mechanism.

To establish an initial Baseline, the Large Electrical Corporation must model the risk landscape assuming that no EUP Undergrounding Projects are constructed. This Baseline modeling must include any non-EUP wildfire mitigation activity in Tier 2 or 3 HFTDs. In subsequent Baselines, the Large Electrical Corporation must include activity outside of the EUP program that the Large Electrical Corporation has initiated or completed since the establishment of the previous Baseline.

This modeling will attempt to account for climate change. Baselines must be measured and reported at the same cadence as other risk model landscape components at 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55 years.

Each Baseline must indicate the version of the modeling system and the model calibration(s) that were used to evaluate it. The Baselines must also indicate the date the Baseline was created, and the naming scheme of the Baselines must be consistent across the lifetime of the EUP. Any comparison of an Undergrounding Project or Alternative Mitigation to a Baseline must indicate what Baseline the comparison is being made to.

For Project-Level comparisons, such as the evaluation of the Project-Level Standard, the Baseline also establishes the pre-mitigation Circuit Segment length and alignment on which to make the future comparisons.

Core Capability 7: Comparisons with Alternative Mitigation Strategies

The Large Electrical Corporation must demonstrate its method for comparing an Undergrounding Project with Alternative Mitigations as detailed in Section 2.7.10. Additionally, if the Undergrounding Project consists of both Undergrounding and overhead hardening Subprojects, as described in Core Capability 5, only the risk reduction due to the Undergrounding Subprojects may be counted toward the Portfolio-Level Standards, Plan Tracking Objectives, and Plan Mitigation Objective. All the Subprojects (including non-undergrounding Subprojects) may be counted toward the Project-Level Standard.

Further details on the required comparisons are given in Section 2.7.10.

2.7.5.1 Model Inputs and Considerations

The Large Electrical Corporation must provide a comprehensive summary of all model inputs used to compute each metric included in its Model Risk Landscape. This summary includes all real-world observations, KDMMs, precursor calculations and any other metric reported in the EUP or Portfolio Coversheet.

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For each input category, the Large Electrical Corporation must formally define the term and describe the original data sources and the purpose of including these factors in the overall Risk Modeling Methodology in a narrative format of at most one page per requirement.

At minimum, the model inputs must include:

a. **Equipment / Assets** (e.g., type, age, inspection, maintenance procedures, etc.)
b. **Topography** (e.g., elevation, slope, aspect, etc.)
c. **Weather** (at a minimum this must include statistically extreme conditions based on weather history and seasonal weather)
d. **Vegetation** (e.g., type/class/species/fuel model, canopy height/base height/cover, growth rates, moisture content, inspection, clearance procedures, etc.)
e. **Climate change** (e.g., long-term changes in seasonal weather; statistical extreme weather; impact of change on vegetation species, growth, moisture, etc. At a minimum, this must include adaptations of historical weather data to current and forecasting future climate.)
f. **Social vulnerability** (e.g., socioeconomic factors, etc.)
g. **Physical vulnerability** (e.g., people, structures, critical facilities/infrastructure, etc.)
h. **Coping capacities** (e.g., limited access/egress, etc.)

2.7.5.2 Version and Calibration Changes

The Large Electrical Corporation must describe its anticipated schedule for updating its modeling system and methods for recording these changes in a narrative section of one page or less in the EUP. The Large Electrical Corporation must establish a naming system to track historical versions and calibrations. The naming system must be described in a narrative section of one page or less in the EUP.

Version changes are qualitative updates that substantially change the way that the risk model operates and must be accompanied by a new model report (see Section 2.7.2), the establishment of a new Baseline, and a historical backtest (see Section 2.7.6).

Version changes must markedly improve the Risk Modeling Methodology. The Large Electrical Corporation must substantiate this improvement through the submission of an updated Model Report, with all the sections and requirements detailed in Section 2.7.2, as a subsection of a Progress Report at least 6 months prior to the integration of the new version into the plan.

Calibration changes are smaller changes that do not significantly impact the Model Risk Landscape and only require the establishment of a new Baseline.

Examples of qualitative updates that are large or significant enough to change the versioning of the modeling system include, but are not limited to:

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a. Adding or removing any models to/from the system.
b. Replacing a model with an alternative.
c. Any update to a model which a third-party model developer employed by the Large Electrical Corporation lists as a version update.
d. Retraining an overparameterized neural network on a new dataset.
e. Applying a new optimization procedure for a non-convex problem.
f. Implementation of a new methodology to compute a Project Variable Modifier (PVM).

Examples of qualitative updates that are not significant updates to the version changes, but do qualify as calibration updates, include, but are not limited to, the following:

a. Updating an existing historical actuarial table.
b. Fixing minor code errors.
c. Cleaning input data.
d. Updating a PVM based on new data, using a process established in the application or previous Progress Report.

The Large Electrical Corporation must include information on modeling changes in a narrative section of at most two pages in the Progress Reports.

2.7.6 Baselines, Backtesting, Model Retention, and Subsequent Model Reports

The Large Electrical Corporation must establish model and calibration retention policies. The Large Electrical Corporation must retain models and calibrations data for the lifetime of the program.

The Large Electrical Corporation must describe its plan to update its Risk Modeling Methodology, including details regarding how and when model version and calibration updates are planned. Any new version or calibration will require a new risk_model_version_id and risk_model_calibration_id in the data submission, respectively. See Appendix C of these Guidelines for more details.

When a new model or model version is introduced to the Risk Modeling Methodology, after the approval of an EUP, the Large Electrical Corporation must submit a Model Report (as described in Sections 2.7.2 and 2.7.5.2 of these Guidelines) as a subsection of the Progress Report to Energy Safety as well as an historical backtest of the new model's impact on all KDMMs for all Baselines since the start of the EUP (Appendix C, Section C.1.5).

In each Model Report, including in Progress Report 0 and subsequent Progress Reports, the Large Electrical Corporation must establish a new Baseline which reflects the existing distribution system as detailed in Section 2.7.5 of these Guidelines.

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Risk scores for new equipment/alignment must be reported in the same granularity, scale and methodology as previously existing equipment. These evaluations must be conducted in accordance with the Large Electrical Corporation's Risk Modeling Methodology, as described in the EUP, in cases where the Large Electrical corporation has not re-evaluated the risk on the new equipment.

2.7.7 Project Variable Modifiers (PVMs)

A Project Variable Modifier is defined as a set of changes that are made to variables in the Risk Modeling Methodology to evaluate the effectiveness of a given project or set of projects and represents how the Large Electrical Corporation values the efficacy of the Alternative Mitigations. The Large Electrical Corporation must list each Project Variable Modifier, explain how the specific PVM was calculated, and explain if and how the use of a specific PVM varies in different evaluations of the Model Risk Landscape. Specifically, the Large Electrical Corporation should provide a general description summarizing what input variables to what calculations are changed, and what is the effect on the output variables and KDMMs. This information may be reported on an average-case basis.

The Large Electrical Corporation must provide a high-level description of the formal numerical processes used to arrive at the PVM. If the Large Electrical Corporation employs third-party studies to get to the PVM, it must cite the studies here. If the PVM is the result of internal studies, then the Large Electrical Corporation must describe the datasets, and detail the formal calculations. The Large Electrical Corporation must also make the third-party studies and data available to Energy Safety upon request, both during the review of the EUP and anytime during the expected lifetime of the assets installed though the EUP.

2.7.8 Portfolio-Level Standards

The Portfolio is the set of all Confirmed Projects that have passed Screen 3. A Portfolio is a unique list of Confirmed Projects, and adding or removing Confirmed Projects from the list constitutes an update to the Portfolio and must be indicated with a new portfolio ID. The Large Electrical Corporation must update the Portfolio as Undergrounding Projects are added, removed, or changed, and report these changes through Progress Reports. All Undergrounding Projects that have passed through Screen 3 (Project Risk Analysis), and have not been abandoned, must be included in the Portfolio.

The Large Electrical Corporation must set an Ignition Risk Decrease Standard and a Reliability Increase Standard (collectively, Portfolio-Level Standards). These Portfolio-Level Standards measure the "substantial" decrease in Ignition Risk and increase in reliability per section 8388.5(d)(2) and will be used to judge the overall efficacy and efficiency of the EUP. These standards must be measured on a per-mile basis.

a. **Ignition Risk Decrease Standard** is the minimum decrease in ignition-related metrics, as measured through formal calculations of the KDMMs across the entire

system at both the System-Level and Portfolio-Level, that the EUP must achieve to meet the required decrease in wildfire risk.

b. **Reliability Increase Standard** is the minimum decrease in Outage Program-related metrics, as measured through formal calculations of the KDMMs across the entire system at both the System-Level and Portfolio-Level, that the EUP must achieve to meet the required increase in reliability.

The Large Electrical Corporation must use KDMMs that represent the minimum reduction of Ignition Risk and Outage Program Risk, across its entire electrical distribution system, on an average-case basis necessary for the EUP to be considered successful under the Plan Mitigation Objective. It is not necessary for each iteration of the Portfolio to meet each of these Portfolio-Level Standards. Comparison to the Portfolio-Level Standards represents an intermediate measurement of the anticipated progress achieved by the Portfolio as scoped at any given time (i.e., those Undergrounding Projects that have passed through Screen 3) in a manner which scales with the size of the Portfolio.

2.7.9 Project-Level Thresholds and Standards

2.7.9.1 Project-Level Thresholds

The Large Electrical Corporation must set and explain a High-Risk Threshold, Ignition Tail Risk Threshold, High Frequency Outage Program Threshold, and Mitigated Risk Threshold (collectively, Project-Level Thresholds), using a combination of the KDMMs to establish the need for mitigation on a Circuit Segment. These Project-Level Thresholds are fixed when the EUP is approved and cannot be altered when risk model versioning or calibration changes occur or when any other changes are made.

a. **High-Risk Threshold** is the Overall Utility Risk level above which a Circuit Segment is considered eligible for examination for expedited undergrounding. The High-Risk Threshold must utilize normalized units, such as risk per mile, to account for the differing lengths of Circuit Segments. The Large Electrical Corporation must provide an explanation of the metric used for normalization and an explanation of why that metric was chosen.

b. **Ignition Tail Risk Threshold** is the measure of consequence above which a Circuit Segment is considered to have significant potential for ignition of a catastrophic wildfire, so that it merits special consideration. This threshold must represent less than 1% of Circuit Segments in the entire system by mile and no more than 10% of the Ignition Consequence by score.

c. **High Frequency Outage Program Threshold** is the measure of likelihood above which a Circuit Segment is considered to have a significantly high likelihood of frequent or prolonged disruption of service to customers. This threshold must measure both likelihood of an Outage Program Event and its anticipated length. This threshold must represent less than 1% of Circuit Segments in the entire system by mile and no more than 10% of Outage Program Likelihood by score.

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2.7.9.2 Project-Level Standards

The Large Electrical Corporation must set and explain Project-Level Standards, using a combination of the KDMMs, to determine the necessary level of risk reduction needed for an Undergrounding Project to be considered to merit inclusion without considering other EUP projects. These Project-Level Standards are measured against the Baseline in place at the time the Undergrounding Project completes Screen 3. The Project-Level Standards are fixed when the EUP is approved and cannot be altered when risk model versioning or calibration changes occur or when any other changes are made.

It is not necessary for every Undergrounding Project in the Portfolio to meet these Project-Level Standards, but any Confirmed Project which does not meet the appropriate Project-Level Standard must be further justified in the narrative submission associated with the Confirmed Project in the relevant section of the tabular data submission (see Appendix C.1.12).

The proposed Project-Level Standards, when considered in the context of the EUP and risk landscape, must ensure the EUP substantially increases electrical reliability by reducing the use of public safety power shutoffs, enhanced powerline safety settings, deenergization events, and any other outage programs, and substantially reduces the risk of wildfire.

a. **High-Risk Project-Level Standard** is the minimum decrease in Ignition Risk and Outage Program Risk, that an Undergrounding Project must achieve to support the Plan Mitigation Objective. This reduction in wildfire risk and increase in reliability must, at minimum, reduce the risk of the Circuit Segment to below the Mitigated Risk Threshold.
b. **High Frequency Outage Program Project-Level Standard** is the minimum decrease in Outage Program Likelihood as measured through formal calculations of the KDMMs that any Undergrounding Project considered under the High Frequency Outage Program must achieve to meet the required substantial increase in electrical reliability achieved by reducing the use of public safety power shutoffs, enhanced powerline safety settings, deenergization events, and any other outage programs.
c. **Tail Risk Project-Level Standard** is the minimum decrease in wildfire likelihood that any Undergrounding Project considered under the Ignition Tail Risk Threshold must achieve to meet the required substantial reduction of the risk of wildfire.

2.7.10 Comparative Metrics

For each Undergrounding Project, the Large Electrical Corporation must compare its project to the required design variations outlined below, including an evaluation of at least two combinations of comparable Alternative Mitigations in Screen 2, and one combination of comparable Alternative Mitigations in Screen 3.

Further information on these required comparisons can be found in Section C.1.11 (Screen 2 Table), Section C.1.12 (Screen 3 Table), Section C.1.13 (Screen 4 Table) and Section C.1.15 (Project Index Table) of Appendix C.

For the purpose of comparisons in this section, the Undergrounding Project is considered to be a 100% undergrounded Circuit Segment in Screen 2. After the project scoping phase in Screen 3, the project must be analyzed both as the Project as Scoped (see Required Design Variations below) which includes all of the Undergrounding and non-undergrounding Subprojects and the Undergrounding as Scoped (see Required Design Variations below). If the Undergrounding Project will be a completely undergrounded Circuit Segment, the Project as Scoped, and Undergrounding as Scoped design variations will have identical information but must be included for completeness of the data submission in Screen 3 and Screen 4.

In Screen 4, the costs, benefits, and CPUC CBR must be calculated for the Project as Scoped, Undergrounding as Scoped, and the Screen 3 Alternative Mitigations. Appendix C.1.13, Screen 4 Table, gives further instructions on the requirements of Screen 4.

Design Variations Required for Comparison:

a. **100% Undergrounded**: A completely undergrounded Circuit Segment must be included as a design variation in Screen 2. In Screen 3, this design variation will be replaced with Project as Scoped.
b. **Project as Scoped**: This design variation must include all work in the final project design, including all Undergrounding and non-undergrounding Subprojects. This design variation must be used to justify the Project-Level Standard.
c. **Undergrounding as Scoped**: This design variation must include only the portion of the Circuit Segment that is to be undergrounded (e.g. just the Undergrounding Subproject(s) without any of the non-undergrounding Subprojects). This design variation must be used to justify the Portfolio-Level Standards, Plan Mitigation Objective, and Plan Tracking Objective. If the Circuit Segment will not contain multiple mitigations, this design variation will be identical to Project as Scoped.
d. **Project Baseline:** For Screen 3 only, the existing Circuit Segment must be analyzed for the comparison of the Undergrounding Project. For Circuit Segments in Wildfire Rebuild Areas, the Pre-Wildfire distribution system and associated risk must be used for the Project Baseline.

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e. **Screen 2 Alternative Mitigations 1**: This design variation must consist of aboveground hardening including installation of covered conductor on the entire Circuit Segment and some type(s) of protective equipment and device settings[11] used to reduce wildfire ignition. The protective equipment and device settings must include protection hardware capable of fast trip and/or sensitive trip settings and modified recloser settings that can be enabled or disabled as needed based on changing conditions in the Tier 2 or 3 HFTD. Additionally, the Large Electrical Corporation must include any additional protection systems and settings that can enhance the safety of the Circuit Segment, as deemed feasible by the Large Electrical Corporation for each project. These may include, but are not limited to, early fault detection, falling conductor protection, high impedance fault protection, rapid earth fault current limiter (REFCL), and partial voltage detection. Examples of existing qualifying programs include Enhanced Powerline Safety Settings (EPSS), Fast Curve Settings, Sensitive Relay Profile (SRP), and Advanced Protection Program. All other applicable aboveground line hardening measures utilized by the Large Electrical Corporation must be included in this design variation unless specific project constraints prevent it.

f. **Screen 2 Alternative Mitigations 2**: This design variation must include one additional mitigation or combination of mitigations that meet or exceed the risk reduction of Alternative Mitigations 1. This can include mitigation strategies currently in use by the Large Electrical Corporation or other new and proven technologies that could be reasonably implemented. For example, rapid earth fault current limiter (REFCL), line removal with remote grid, or advanced grid monitoring. The mitigations used in Alternative Mitigations 1 may be included in the combination of mitigations chosen for Alternative Mitigations 2.

g. **Screen 3 Alternative Mitigations**: The Alternative Mitigations used in Screen 3 and Screen 4 will be derived from the results of the Screen 2 comparison, and any new information obtained from initial project scoping. The Screen 3 Alternative Mitigations must, at a minimum, include aboveground line hardening, covered conductor and some type of protective equipment and device settings for any line not removed, as in Screen 2 Alternative Mitigations 1. The Large Electrical Corporation must also include any other mitigation or combination of mitigations that it has determined would be well-suited for the specific project location.

[11] The term Protective Equipment and Device Settings (PEDS) has been defined by the CPUC as advanced safety settings implemented by electric investor-owned utilities (IOUs) on electric utility powerlines to reduce wildfire. (https://www.cpuc.ca.gov/industries-and-topics/wildfires/protective-equipment-device-settings, accessed September 09, 2024)

Additional Design Variations:

- **Additional Design Variations:** The Large Electrical Corporation may include additional design variations for any other combination of alternative mitigations that it wishes to report. Any unique combination of Alternative Mitigations that meet the Project-Level Standards and could be reasonably implemented by the Large Electrical Corporation should be included.

In every design variation listed above, only the feasible work should be included. For example, if the Circuit Segment contains a large river crossing, boring under the river should not be included in the design of a fully undergrounded Circuit Segment if its cost is prohibitively high relative to the rest of the project. Instead, a more feasible design must be used, such as an over river crossing, or the use of bridge conduit if available.

In addition to the EUP narratives required in Sections 2.4.4 and 2.4.5, each Progress Report must include a narrative detailing the Large Electrical Corporation's ongoing review of possible Alternative Mitigations. The narrative should detail what mitigations were considered since the last Progress Report, and what factors lead to the continued use of, or change in, the Alternative Mitigations used in the EUP's Project Acceptance Framework. The narrative must also include details on any relevant new and emerging technologies, and how the Large Electrical Corporation is including these technologies in its EUP. For example, the narrative must include updates on any applicable ongoing pilot programs, such as Rapid Earth Fault Current Limiters (REFCL), and details on what Portfolio-Level analysis was done to evaluate the potential benefits of implementation.

2.8 Reporting Metrics

This section contains detailed instructions on how the Large Electrical Corporation will report on its Risk Modeling Methodology, Portfolio of Undergrounding Projects, individual Undergrounding Projects, development of new models, and non-model-based projections. Template files for use by the Large Electrical Corporation will be made available on Docket #2023-UPs at Energy Safety's website. Where possible, Energy Safety and the CPUC reporting requirements will be streamlined and consistent.

2.8.1 Tabular Data Submission

Progress Report 0 and each subsequent Progress Report must include the following tables and reflect the most current information as of each Progress Report submission:

a. A Plan Table identifying information about the Large Electrical Corporation, the EUP, and thresholds. This Table is not modified during Progress Reports.

b. A KDMM Table listing all KDMMs used by the Large Electrical Corporation in its EUP, with explanations. This table is not modified during Progress Reports.

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c. A Risk Model Version History Table listing and describing all iterations of the risk model versioning and calibration to date.
d. A Portfolio Table that summarizes the Undergrounding Projects at the System-Level and Portfolio-Level.
e. A Risk Model Backtesting Table listing risk models versioning and calibration information, along with their corresponding KDMM values for each version and calibration.
f. A Circuit Segment Identification Table that summarizes identifying information for each Circuit Segment in the utility service territory.
g. A Circuit Segment Changelog Table that tracks changes to Circuit Segment IDs and/or Circuit Segment lengths.
h. A Circuit Segment Risk Score Table that summarizes the risk values for each Circuit Segment in the utility service territory.
i. A Screen History Table tracking the progress of each Circuit Segment through the multiple screens required before an Undergrounding Project is constructed.
j. A Project Table for each project, after passing Screen 2, that details each Undergrounding Project, including risk tranching, selection justification, and location at the county and division level.
k. A Screen 2 Table comparing the cost and benefit information for each project, after passing Screen 2, against multiple Alternative Mitigations.
l. A Screen 3 Table comparing the detailed risk modeling projections for each project, after passing Screen 3, against multiple Alternative Mitigations.
m. A Screen 4 Table comparing the cost and benefit information of the fully scoped Confirmed Project, and the final combination of Alternative Mitigations used in Screen 3.
n. A Subproject Table listing Subproject IDs, their mitigation selection, and construction information for all Subprojects that are part of Confirmed Projects that have passed Screen 4.
o. A Project Index Table which summarizes the project information in an easily searchable format. See Appendix C.1.15 of these Guidelines for details.

Details about each table, the requirements for the submission, and other instructions are found in Appendix C.1 of these Guidelines.

2.8.2 JSON Data Submission

The Large Electrical Corporation must submit the following JSON data in each Progress Report, including Progress Report 0:

a. A Project Variable Modifiers JSON as described in Section 2.8.5.2 and Appendix C of these Guidelines.

b. A Model Risk Landscape JSON, as described in Appendix C of these Guidelines, with information for each project that has passed Screen 3.

These files must reflect the most current information as of each Progress Report submission. Further details on JSON submissions are in Section 3.11 of these Guidelines and in Appendix C.

The Large Electrical Corporation must convert its JSON data submission into Comma Separated Values (CSV) format and host the CSV files on a publicly available webpage dedicated to its EUP, as described in Section 3.8.1 of these Guidelines.

2.8.3 Spatial Data Reporting for Projects

The Large Electrical Corporation must report additional modeling and Project-Level data though a geodatabase submission. This information will identify isolatable Circuit Segments, Undergrounding Projects, overhead lines that will be deenergized after completion of projects, and critical pieces of infrastructure equipment. The Large Electrical Corporation must update information reported in geodatabase submissions in each Progress Report.

Further details about these submissions are found in Appendix C.3.

2.8.4 Data Validation

Energy Safety will review and validate data and reject data submissions that do not meet the criteria in this section. If a submission fails the validation check and is rejected, the Large Electrical Corporation must correct the errors and resubmit its data as directed by Energy Safety.

Energy Safety will review EUP data submissions according to the following validation criteria:

a. **Data Consistency**: Data is properly labeled with unique integer identifiers, and labels remain consistent both within a submission and from one submission to another.
b. **Structural Integrity**: Data conforms to the required types and modes, such that it can be ingested into Energy Safety data systems.
c. **Completeness**: All required components are included in each submission.
d. **Computational Accuracy**: All summations and other data aggregations within the submission are calculated accurately.

Additionally, when there is no data for a particular field, the Large Electrical Corporation must leave the field null (empty), except where “N/A” is specified and the conditions for its use are met. The Large Electrical Corporation must not place “Unknown”, “0”, empty spaces, or other placeholders into fields, or use the “Other, see comment” option when no data are available.

2.8.5 Risk Modeling Methodology Verification Data

This section describes the numerical and visual elements that the Large Electrical Corporation must submit to establish the veracity of its Risk Modeling Methodology.

2.8.5.1 Model Risk Landscape Variables Table

The EUP must include a Model Risk Landscape Variables Table as referenced in Section 2.7 of these Guidelines, that lists each metric in the Large Electrical Corporation's Model Risk Landscape per the example below and report values at the highest available resolution. This table must include the numerical type of each metric, which risk factors that it addresses, the resolution of the modeling, indicate whether the metric is considered a KDMM, and identify what other metric(s) it is a precursor for.

Table 4. Example Model Risk Landscape Variables Table

Field Name	Type	Addresses	Resolution	Is KDMM?	Precursor for
Ignition Risk	TBD	Ignition Risk	Per Circuit Segment	Yes	None
Ignition Consequence	TBD	Ignition Risk	Per Area Unit	Yes	Ignition Risk Score
Ignition Likelihood	Prob-ability	Ignition Risk	Per Circuit Segment	No	Ignition Risk Score
Equipment Risk	TBD	Ignition Risk	Per Circuit Segment	No	Ignition Likelihood, Ignition Consequence, Ignition Risk score
Outage Program Risk	TBD	Outage Program Reliability	Per Circuit Segment	Yes	None
Outage Program Likelihood	Prob-ability	Outage Program Reliability	Per Circuit Segment	Yes	Outage Program Risk

An example table listing the metrics of a model risk landscape and explaining its key attributes.

2.8.5.2 Reporting Project Variable Modifiers

The EUP and each Progress Report (including Progress Report 0) must contain a table summarizing the PVMs as referenced in Section 2.7 and Section 2.8.6 of these Guidelines.

The “Mitigation Type” column describes the nature of the work conducted in the project. The Large Electrical Corporation must, at minimum, consider the Alternative Mitigations described in Section 2.7.10. It may include other alternative methods or divide these types of projects into differentiable sub-types when appropriate.

The “Model” column indicates which models the PVM effects.

The “Inputs Modified” column describes which of the model inputs are changed.

The “Delta” column describes how the inputs are changed, and may be represented as percentages, changes in distribution, changes in category or any other changes to the inputs that the PVM accomplishes.

The “Other Notes” column contains narrative material that clarifies the way that the PVM affects the inputs.

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Table 5. Example Project Variable Modifiers Inputs

Mitigation Type	Model	Inputs Modified	Delta	Other Notes
Undergrounding	Equipment Model	Self-Combustion Likelihood	-94 +/- 3%	This PVM has a variable delta depending on the age of the equipment it is replacing.
	Ignition Likelihood Model	Contact From Vegetation	-96%	
		Contact From Object	-94%	
Covered Conductor	Ignition Likelihood Model	Contact From Vegetation	-70%	

An example table listing the Project Variable Modifiers for different mitigation strategies. Note that the table includes what inputs to what models are changed and how they are changed. The Other Notes column allows for a short explanation of the change.

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The Large Electrical Corporation must report the effects of applying these PVMs to its Portfolio. The Large Electrical Corporation must compute the distribution of the changes to each KDMM for each mitigation type and report it in a table that will be attached to the Portfolio Coversheet. An example is given below:

Table 6. Example Project Variable Modifiers Outputs

Mitigation Type	KDMM	Change	Variance
Undergrounding	Ignition Risk	-90%	+/-5%
	Ignition Likelihood	-90%	+/-5%
	Outage Program Risk	-40%	+/-5%
Covered Conductor	Ignition Risk	-90%	+/-5%
	Ignition Likelihood	-90%	+/-5%
	Outage Program Risk	-40%	+/-5%

An example table showing how the Project Variable Modifiers for different mitigation strategies effects KDMMs on average. It reports the mean and variance.

2.8.5.3 Verifying and Validating New Model Versions

If the Large Electrical Corporation changes its Risk Modeling Methodology in a way that triggers a versioning update, it must backtest the new models using historical data back to the start of the EUP. These backtests must include a Project-Level analysis of each Confirmed Project that passed through Screen 3 (Project Risk Analysis) in that time. These backtests must also include Portfolio Coversheets corresponding to each calibration employed since the previous update.

The results of these tests must be submitted as an additional data submission following the data schema established in Appendix C.

2.8.6 Reporting a Portfolio of Undergrounding Projects

The Large Electrical Corporation must establish a naming system to track the evolution of the Portfolio over time. Adding or removing any project to or from the Portfolio constitutes a

Portfolio update and will be indicated by incrementing some value(s) in name. The plan can only have one Portfolio.

2.8.6.1 Portfolio Coversheet Overview

The Portfolio Coversheet is a text document which summarizes the macro-level impacts of the EUP. The Large Electrical Corporation must submit the Portfolio Coversheet in Progress Report 0 and each subsequent Progress Report. The content of the Portfolio Coversheet must be updated with the most up-to-date information available in each Progress Report.

The figures and tables in the Portfolio Coversheet will summarize the most important aspects of the risk modeling at the System-Level and Portfolio-Level, and must be accompanied by a data submission as detailed in Appendix C.

The Portfolio Coversheet must include a narrative section which details the formal definition and calculations of the Portfolio-Level Standards as directed in Section 2.7.8 of these Guidelines.

The Portfolio Coversheet must include a narrative of no more than one page explaining why any Circuit Segment in the top 5% of Overall Utility Risk by score was not included in the EUP.

The Portfolio Coversheet must include a table showing the instantaneous and cumulative values or scores for each KDMM at 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55 years. The instantaneous values describe the risk at a single moment in time, while the cumulative values indicate the accumulation over a time. Values that do not accumulate over time, such as consequence scores, must be reported as a value at a given time.

2.8.6.2 System and Portfolio-Level Risk Matrices and Profiles for Key Decision-Making Metrics

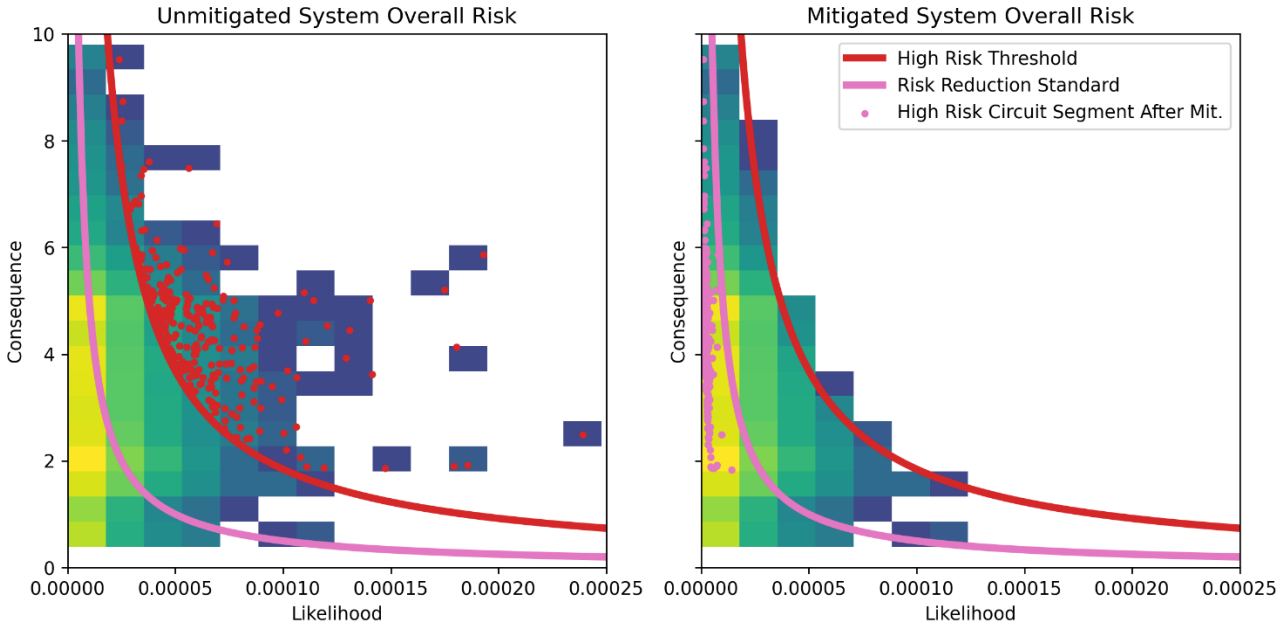
The EUP must include a series of visualizations and tables for each of the KDMMs showing the KDMM's distribution both with and without the Portfolio's modeled mitigation. These visualizations will be included in the Portfolio Coversheet.

On the Portfolio Coversheet, each KDMM's distribution must be reported on both a system-wide and Portfolio-wide scale and emphasize the position of projects within the Risk Landscape. Every figure and table on the Portfolio Coversheet must include a caption explaining the figure.

Risk scores, the product of likelihood and consequence, must be reported as two-dimensional risk matrices. Risk scores can be weighted if appropriate. Two examples of risk score matrices for Ignition Risk are presented below (Figures 4-7), followed by another example of a risk score matrix for Outage Program Risk (Figures 8-9).

Examples are given below. Note that the units and scales are not meant to be realistic and are for illustrative purposes only.

Figure 4. Example of Risk Score Matrix Demonstrating Substantial Improvements in Overall Utility Risk Expected due to EUP

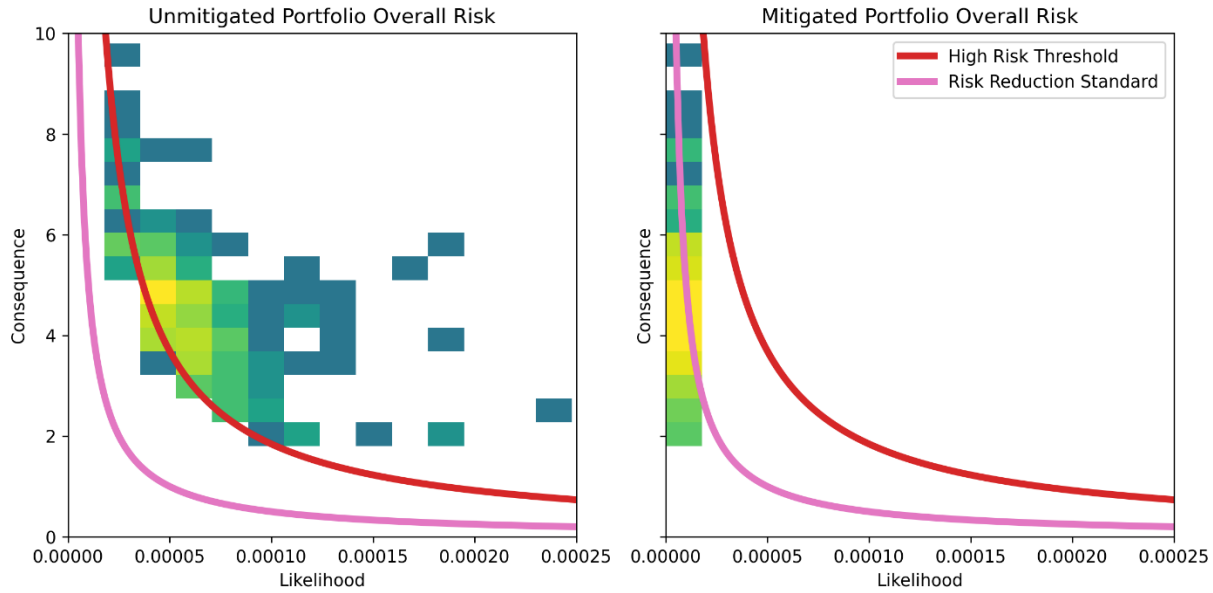


Demonstration of substantial improvements in Overall Utility Risk expected due to EUP, using only Overall Utility Risk as a KDMM. Each plot shows potential Adverse Event Consequence on the y-axis (in arbitrary units), and Adverse Event Likelihood on the x-axis (in arbitrary units), considering both Outage Program Risk and Ignition Risk. The distribution of a model system of Circuit Segments is shown using the heatmap in background. The red line shows the High-Risk Threshold used to identify projects to underground, and the pink line is the Overall Utility Risk Decrease Project-Level Standard required for projects to reach after mitigation.

Left: Data for the electrical distribution system, before any EUP mitigations have taken place. The red points represent all Circuit Segments selected for Undergrounding, which are selected because they are found above the High-Risk Threshold line.

Right: Data for the full system after Undergrounding. The heatmap has changed to reflect the Circuit Segments moving to lower likelihood. Pink points represent the same selected Circuit Segments after mitigation.

Figure 5. Example of Risk Score Matrix for Portfolio-Level Overall Utility Risk

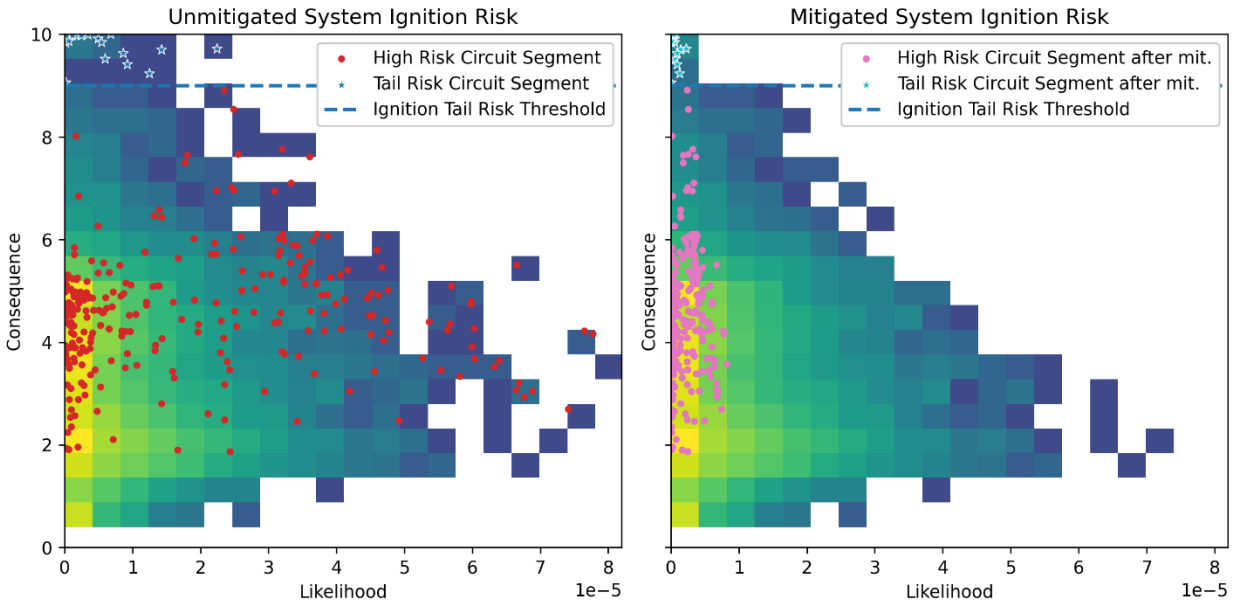


Same as Figure 3, but only showing the heatmap of the Portfolio, not the full system.

Left: The Portfolio prior to mitigation. Right: The same Portfolio after mitigations are applied.

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Figure 6. Example of Risk Score Matrix for Demonstration of Substantial Improvements in Ignition Risk



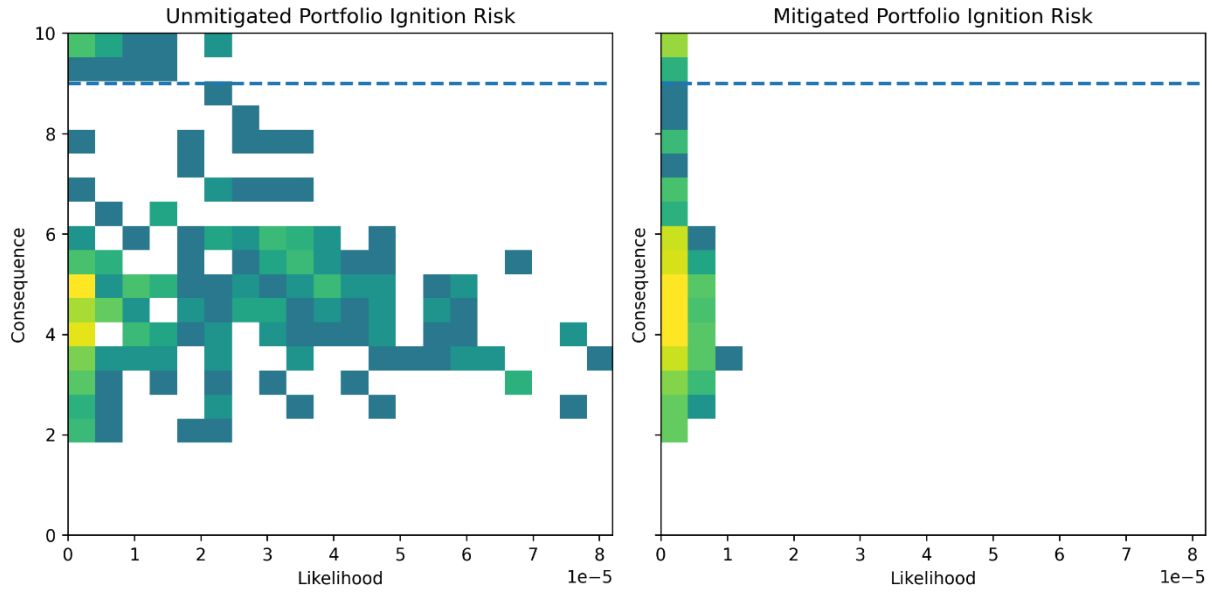
A demonstration of substantial improvements in Ignition Risk expected due to EUP, using overall risk (of Outage Programs and Ignition Risk), as well as wildfire consequence, as KDMMs. Each plot shows potential Ignition Consequence on the y-axis (in arbitrary units), and Ignition Likelihood on the x-axis (in arbitrary units). The distribution of a model system of Circuit Segments is shown using the heatmap in background, with the Ignition Tail Risk Threshold shown as a blue dotted line.

Left: Data for the electrical distribution system, before any EUP mitigations have taken place. The red points represent all Circuit Segments selected for Undergrounding due to high overall risk, and blue stars represent the Circuit Segments selected for exceeding the Ignition Tail Risk Threshold.

Right: Data for the full system after Undergrounding. The heatmap has changed to reflect the Circuit Segments moving to lower likelihood. Pink points and teal stars represent the same selected high-risk and tail-risk Circuit Segments, respectively, after mitigation.

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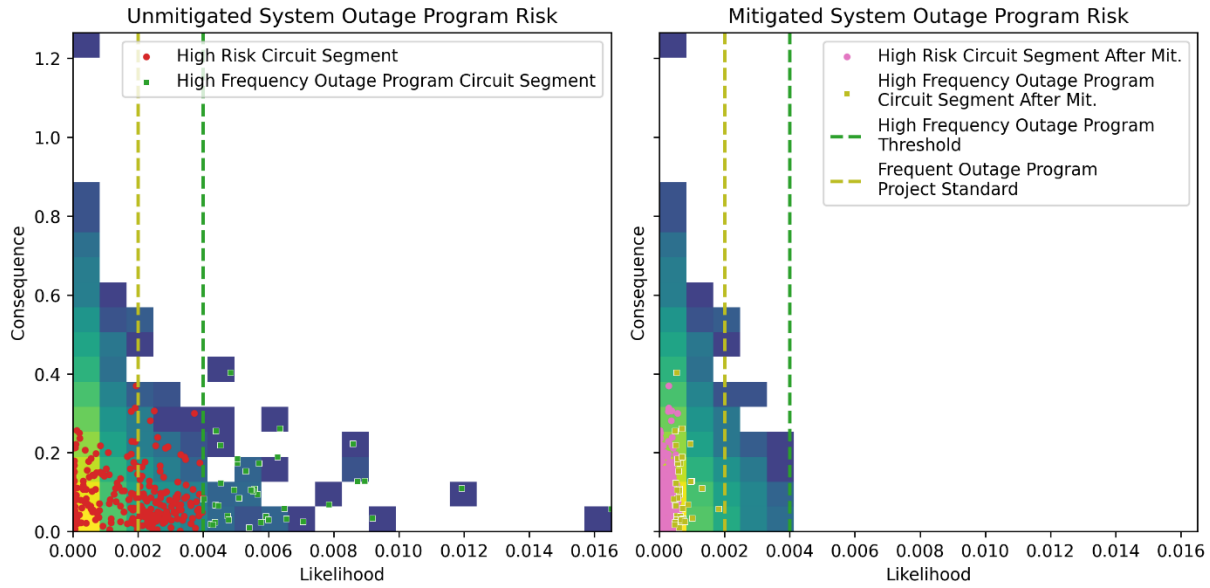
Figure 7. Example Risk Score Matrix for Portfolio-Level Ignition Risk



Same as Figure 5, but only showing the heatmap of the Portfolio of projects, not the full system. Left: The Portfolio prior to mitigation. Right: The same Portfolio after mitigations are applied.

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Figure 8. Example of Risk Score Matrix for Demonstration of Substantial Improvement in Outage Program Risk



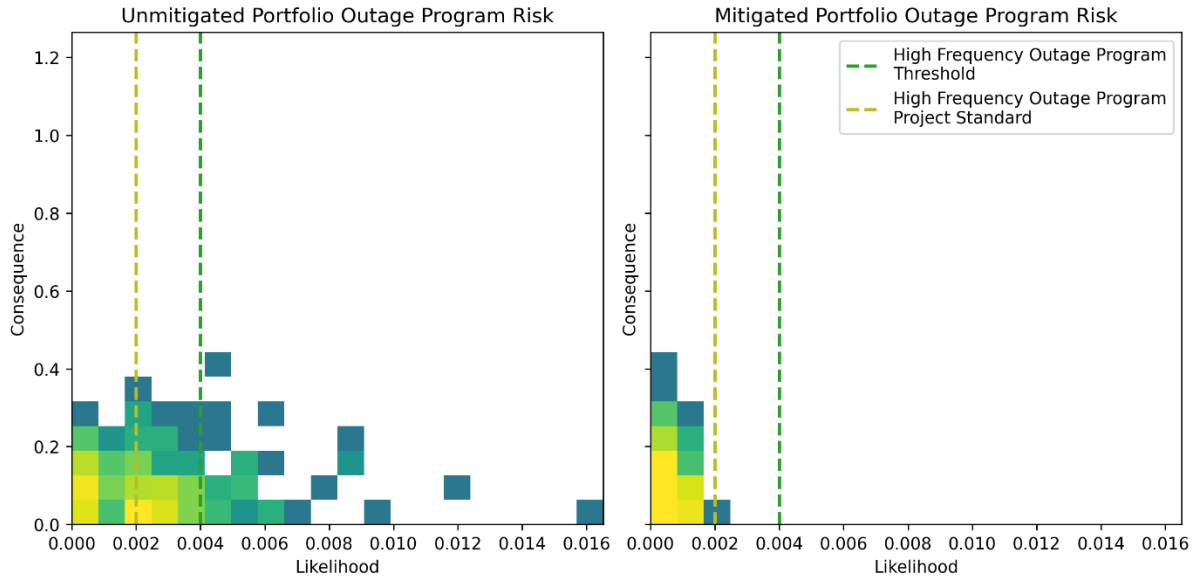
Demonstration of substantial improvement in Outage Program Risk expected due to EUP, using overall risk (of Outage Programs and Ignition Risk), as well as Outage Program Likelihood, as KDMMs. Each plot shows potential Outage Program Consequence on the y-axis (in arbitrary units), and Outage Program Likelihood on the x-axis (in arbitrary units). The distribution of a model system of Circuit Segments is shown using the heatmap in background, with High Frequency Outage Program Threshold shown as a green dotted line and High Frequency Outage Program Project-Level Standard is shown as an olive dotted line.

Left: Data for the electrical distribution system, before any EUP mitigations have taken place. The red points represent all Circuit Segments selected for Undergrounding due to high overall risk, and green squares represent the Circuit Segments selected exceeding the High Frequency Outage Program Threshold.

Right: Data for the full system after Undergrounding. The heatmap has changed to reflect the Circuit Segments moving to lower likelihood. Pink points and olive squares represent the same selected High-Risk and High Frequency Outage Program Circuit Segments, respectively, after mitigation.

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Figure 9. Example Risk Matrix for Portfolio-Level Outage Program Risk

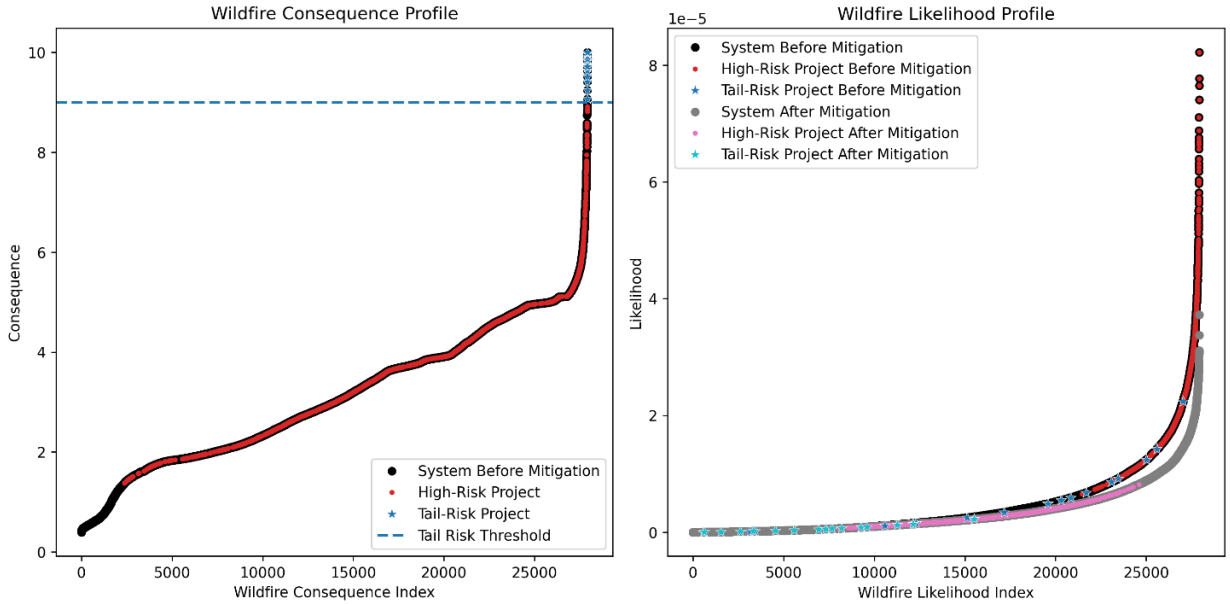


Same as Figure 7, but only showing the heatmap of the Portfolio of projects, not the full system.

Left: The Portfolio prior to mitigation. Right: The same Portfolio after mitigations are applied. Ignition Likelihood and Ignition Consequence are reported as profiles, ranked in ascending order. The Ignition Consequence Profile must indicate the Large Electrical Corporation's Ignition Tail Risk Threshold. Outage Program Likelihood and Outage Program Consequence must be reported similarly to Ignition Likelihood and Ignition Consequence. The System Outage Program Likelihood Profile must indicate the Large Electrical Corporation's High Frequency Outage Program Threshold and High Frequency Outage Program Project-Level Standard.

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Figure 10. Example of Ignition Consequence and Likelihood Profiles



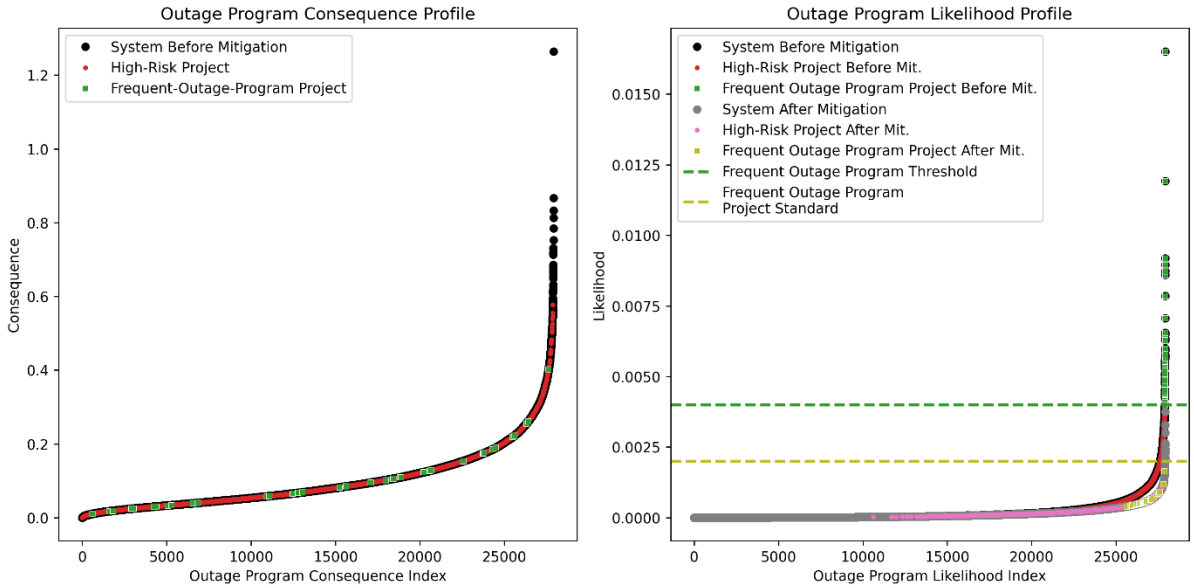
Ignition Consequence and Likelihood Profiles, showing selected Circuit Segments using Ignition Risk and wildfire consequence as KDMMs.

Left: All Circuit Segments within the system ordered from lowest to highest consequence, with the y-axis showing consequence scores (arbitrary units). The blue line is the Tail Risk Threshold for selection via Ignition Consequence, and blue stars are Circuit Segments above this line. Red dots indicate High-Risk Projects, selected due to high Ignition Risk. Because the mitigations considered here can only impact likelihood and not consequence of wildfire, there is no change to this graph after mitigation.

Right: All Circuit Segments within the system ordered from lowest to highest Ignition Likelihood, with the y-axis showing likelihood scores (arbitrary units). Red points and blue stars are the same Circuit Segments as in the leftmost plot, though they are not ranked in the same order. Plotted over this is the system after mitigation (grey points), with the pink points and cyan stars showing the undergrounded high-risk (red points) and tail-risk (blue stars) Circuit Segments, respectively.

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Figure 11. Example Outage Program Consequence and Likelihood Profiles



Outage Program Consequence and Likelihood Profiles showing selected Circuit Segments using Outage Program Risk and Outage Program Consequence as KDMMs.

Left: All Circuit Segments within the system ordered from lowest to highest consequence, with the y-axis showing consequence scores (arbitrary units). Green squares are Undergrounding Projects selected because their Outage Program Likelihood exceeds the High Frequency Outage Program Threshold (see right-side plot). Red dots indicate High-Risk Projects, selected due to high Outage Program Risk. Because the mitigations considered here can only impact likelihood and not consequence of Outage Programs, there is no change to this graph after mitigation.

Right: All Circuit Segments within the system ordered from lowest to highest Outage Program Likelihood, with the y-axis showing likelihood scores (arbitrary units). The green line is the High Frequency Outage Program Threshold for selection via Outage Program Likelihood, and the olive line is the standard for likelihood reduction. Green squares are Circuit Segments above the green line, and olive squares are the same segments after mitigation, which will fall below the olive line. Red points and green squares are the same Circuit Segments as in the leftmost plot, though they are not ranked in the same order. Plotted over this is the system after mitigation (grey points), with the pink points and olive stars showing the undergrounded high-risk and high frequency outage Circuit Segments, respectively.

The Large Electrical Corporation must report other KDMMs similarly. The visualizations must demonstrate the distribution of the metric over the entire system and within the scope of the Portfolio separately. Additionally, the visualizations must illustrate the Large Electrical Corporation's approximation of its risk profile both before and after the proposed mitigations. Note that these visualizations are not meant to be a comprehensive examination of the EUP, but rather a summary of the most critical metrics.

The Large Electrical Corporation must indicate how it computes the integration, summation, quadrature, or likelihood estimation used to compute this accumulation in its definition of these terms (See Section 2.7.6 of these Guidelines more details).

This discussion will include any discount rates, risk-attitude weights or other user parameters used to model the accumulation of risk over time.

Each of these metrics must be reported for both the Baseline regime and the Portfolio at the System-Level and Portfolio-Level as detailed in Appendix C.1 and C.2.

2.8.6.3 Portfolio Development

The Large Electrical Corporation must detail its system for tracking changes in the Portfolio of Undergrounding Projects over time as well as the consistency of its modeling updates.

The Large Electrical Corporation must track how its Portfolio of Undergrounding Projects has changed over the duration of the EUP by applying the most up-to-date modeling system version and calibration to each of the historical Portfolios considered during the lifetime of the EUP.

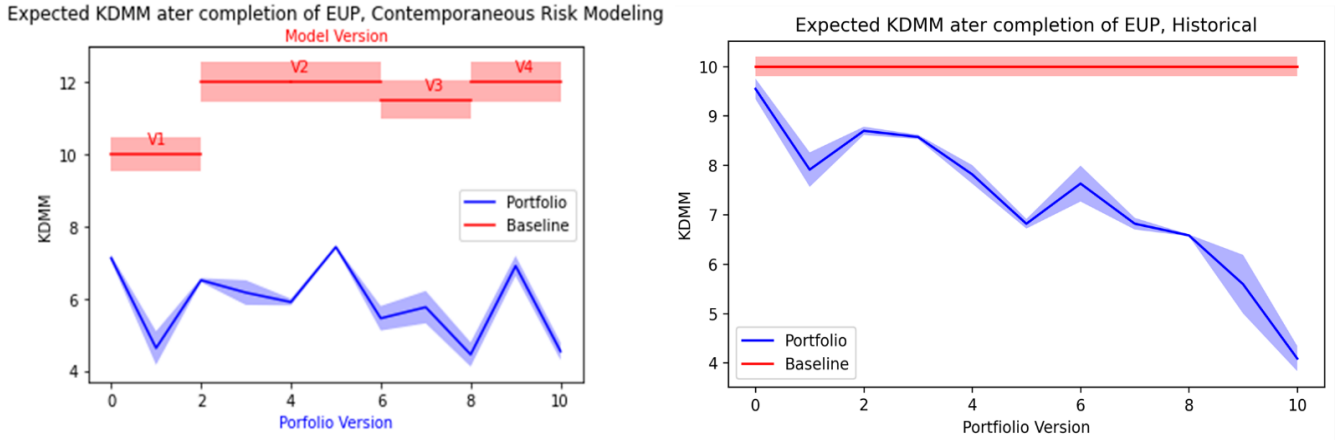
The Large Electrical Corporation must summarize this information in each Progress Report, including Progress Report 0, by creating two plots for each KDMM showing their mean value and first standard variation, measured over the total Portfolio footprint. The total Portfolio footprint is defined as the union of all Circuit Segments included in any Portfolio.

The first plot must show the instantaneous value of the KDMM after the EUP has been completed, as measured by the most recent version and calibration of Risk Modeling Methodology, compared to the Baseline at the beginning of the plan, as measured by the most recent version of the Risk Modeling Methodology.

The second plot must show the same metrics but measured by the version of the Risk Modeling Methodology that was most recent at the time the Portfolio was updated. An example of a KDMM graph is shown below:

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Figure 12. Example KDMM Development



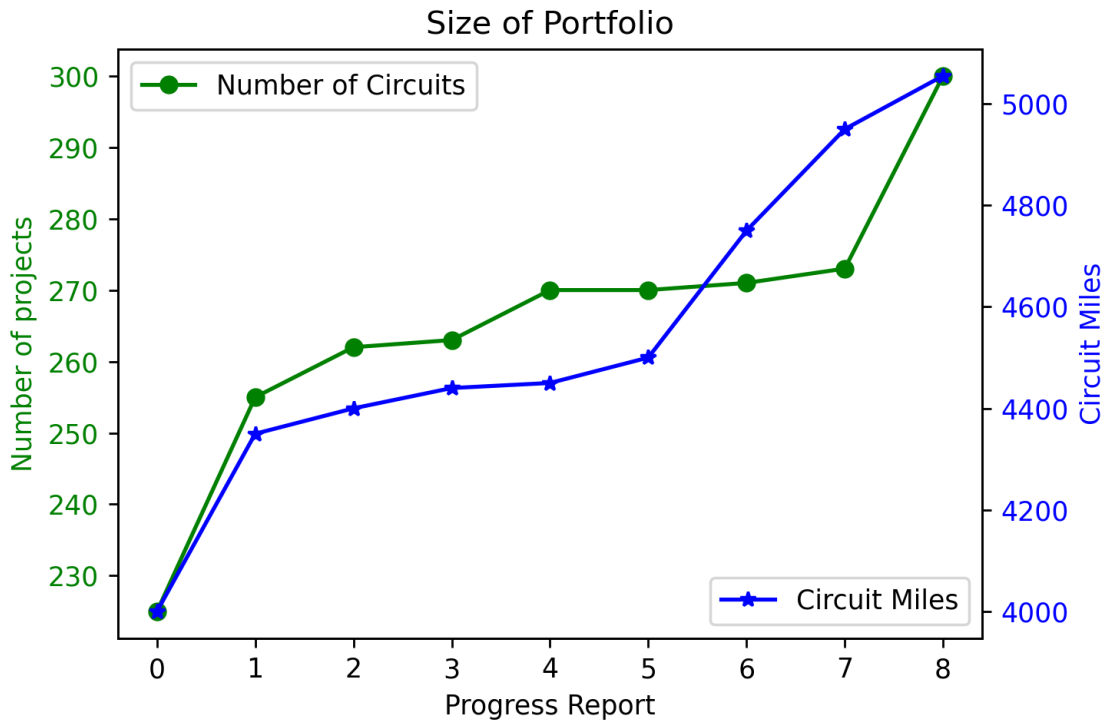
Left: A plot showing a KDMM's Baseline (red) and modeled value after EUP mitigation (blue) using the most recent version of the model evaluation. The x-axis denotes a different version of the Portfolio.

Right: A plot showing a KDMM's Baseline (red) and modeled value after EUP mitigation (blue) using the version of the Risk Modeling Methodology which was most recent at the time the Portfolio was updated.

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The Large Electrical Corporation must report a graph showing the size of each Portfolio as measured in total Undergrounding Projects and total circuit miles. The graph must include representations of complete and ongoing Undergrounding Projects.

Figure 13. Example Portfolio Development Over Progress Reports



An example figure showing the size of the Portfolio over different Progress Reports. The left y-axis shows the number of projects (green line), and the right y-axis shows circuit miles.

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2.8.6.4 Portfolio Coversheet Organization

The Portfolio Cover sheet must be organized as follows:

Table 7. Portfolio Coversheet Organization

Section	Requirements
Narrative Justification	See Section 2.8.6.1 of these Guidelines
Key Decision-Making Metrics Profiles	See Section 2.8.6.2 of these Guidelines
Project Variable Modifiers	See Section 2.7.7 of these Guidelines
Portfolio Development	See Section 2.8.6.3 of these Guidelines

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3. Process and Evaluation

This section sets forth the procedural direction and evaluation process for an EUP that is submitted to Energy Safety pursuant to section 8388.5.

3.1 Plan Pre-Submission Review

3.1.1 Purpose of Pre-Submission Review

Energy Safety will first assess the Large Electrical Corporation's EUP for completeness based on the statutory requirements and these Guidelines. The EUP submission must, at a minimum, contain each of the required components outlined in section 8388.5 and these Guidelines as described below in the pre-submission checklist.

The pre-submission review is a review for completeness and inclusion of each of the items on the checklist below; the substantive review of the EUP content occurs during the EUP evaluation process.

3.1.2 Pre-Submission Review Process

Ten business days prior to transmitting an EUP to Energy Safety for pre-submission review, the Large Electrical Corporations must notify Energy Safety of its intent to submit an EUP for a pre-submission review by sending an e-mail to ElectricalUndergroundingPlans@energysafety.ca.gov.

After notifying Energy Safety that it will be submitting an EUP for a pre-submission review, the Large Electrical Corporation is required to meet and confer with Energy Safety staff to discuss the contents of the forthcoming EUP pre-submission.

The Large Electrical Corporation must provide a copy of the EUP pre-submission for Energy Safety review.

Energy Safety uses the Pre-Submission Checklist below to confirm that all content required by section 8388.5 and these Guidelines is included and that each item appropriately cross-references the relevant section(s)/ or sub-section(s) of the EUP. If information for an item on the Pre-Submission Checklist is not included in the EUP pre-submission, Energy Safety marks this element as incomplete.

The Pre-Submission Checklist includes the following:

a. The EUP has provided a narrative for each section and sub-section in the EUP. If the EUP contains a blank section, an inapplicable cross reference, or insufficient detail, Energy Safety marks this element incomplete.
b. The EUP has addressed all components of the EUP that have been identified in section 8388.5(c).

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c. The EUP has addressed the requirements outlined in section 8388.5(d)(2).
d. The EUP has addressed the requirements related to the inclusion of a Project Acceptance Framework.
e. The EUP includes the objectives and targets developed by the Large Electrical Corporation for tracking and evaluation purposes (including all of the objectives and targets required by these Guidelines).
f. The EUP has included the list of Undergrounding Projects.
g. The EUP has responded to requirements related to data and modeling submissions, including model versioning and calibration, and including the data validation requirements in Section 2.8.4.
h. The EUP has submitted the required Portfolio Coversheets.

The Large Electrical Corporation must include a pre-submission review cover sheet that documents the page number(s) of where each item on the Pre-Submission Checklist can be found in the submitted EUP. The pre-submission review cover sheet may not reference internal cross-references and must reference the direct page number.

Energy Safety makes a determination and informs the Large Electrical Corporation of its findings.

a. If a Large Electrical Corporation's EUP satisfies the pre-submission review, Energy Safety will instruct the Large Electrical Corporation to submit its EUP as-is, with no changes.
b. If a Large Electrical Corporation's EUP does not satisfy the pre-submission review, Energy Safety will notify the Large Electrical Corporation as to the missing or incomplete information (i.e., incomplete, not fully referenced, or unsubstantiated statutory compliance checklist).

After Energy Safety affirms that the EUP pre-submission contains the required contents, Energy Safety will open a docket for the EUP, and the Large Electrical Corporation can submit the EUP for evaluation.

Energy Safety will not accept public comments on the EUP pre-submission or review.

3.2 Large Electrical Corporation EUP Submission

Appendix B to these Guidelines contains specific instructions for narrative and other content. A Large Electrical Corporation must submit all documents referenced in the EUP, to the docket established for that Large Electrical Corporation's EUP. In addition, the Large Electrical Corporation must mail five hard copies, excluding appendices, of the EUP to:

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Office of Energy Infrastructure Safety
Attn: Deputy Director, Electrical Infrastructure Directorate
715 P Street, 15th Floor
Sacramento, CA 95814

Data submissions must be made following the data requirements in these Guidelines including Appendix C.

The nine-month statutory period for Energy Safety to review the EUP starts on the date the EUP is filed for evaluation.

Five business days prior to submitting an EUP for evaluation the Large Electrical Corporation must notify Energy Safety of its intent to submit by sending an e-mail to ElectricalUndergroundingPlans@energysafety.ca.gov.

3.2.1 Confidentiality

The submission process for submitting confidential information is set forth in section 29200 of Title 14 of the California Code of Regulations.

3.2.2 Format

Every document submitted to Energy Safety must comply with the formatting requirements below.

a. Electronically filed documents shall be word searchable and accessible as directed in these Guidelines.
b. Paper documents must be:
    i. Typewritten or otherwise mechanically printed;
    ii. On paper 11 inches long and 8 ½ inches wide;
    iii. Printed on both sides of the page if feasible; and
    iv. Bound securely.
c. Both electronic and paper documents must:
    i. Be in a clear, easily readable font of at least 11 points;
    ii. Have consecutively numbered pages; and
    iii. Include the following information on the first page:
        Name of the docket;
        Number of the docket; and
        Title of the document.

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d. For electronic documents, signatures may be electronic.[12]

3.3 Evaluation of Plan

Energy Safety will evaluate the EUP pursuant to the requirements of sections 8388.5(c) and (d)(2) and may approve or deny an EUP or issue a Modification Notice (see Section 3.5 below) if there are deficiencies in the EUP or supporting documents.[13]

An EUP has met the requirements of sections 8388.5(c) and (d)(2) when Energy Safety determines that the Large Electrical Corporation has demonstrated that the EUP will substantially increase electrical reliability by reducing the use of Public Safety Power Shutoffs, Enhanced Powerline Safety Settings, deenergization events, and any other outage programs, and substantially reduce of the risk of wildfire.

To make a determination of whether the EUP has met the requirements, Energy Safety will consider the following.

a. The EUP responds to the requirements contained in section 8388.5(c) and (d)(2) and these EUP Guidelines.
b. The EUP is supported by the risk profiles reported by the Large Electrical Corporation in the initial Baseline and other data sources.
c. The EUP is supported by results from modeling and data analytics provided pursuant to statutory and guidelines requirements.
d. The Project Acceptance Framework is feasible and effective.
e. The plan objectives and targets (including the Plan Mitigation Objective and the Plan Tracking Objectives) are adequate for tracking progress and compliance beginning on the start date of the 10-year period for the EUP.
f. The data submitted is consistent with the data reporting requirements and the modeling methodology reported in the EUP.
g. The EUP approach for model retention, data submission, identification of Wildfire Rebuild Areas and other activities that continue for the life of the EUP are feasible and effective.

To assess the EUP, Energy Safety may rely upon the following:

a. The Large Electrical Corporation's EUP, including errata;
b. Public and stakeholder comments;

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[12] Gov. Code, § 16.5.

[13] Energy Safety's evaluation and decision on the EUP is not an approval of, or agreement with, costs associated with the EUP, which will be subject to review and approval by CPUC.

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c. Current and past WMPs;
d. The Large Electrical Corporation's data submissions;
e. The Large Electrical Corporation's responses to data requests; and
f. Any other information Energy Safety may require for the evaluation of the Large Electrical Corporation's EUP.

3.4 Errata

An errata is a correction of published text and does not include modifications required by Energy Safety as part of the Modification Notice process.

A Large Electrical Corporation may submit an errata as follows:

Substantive Errata: If within the first 10 days after the date on which the Large Electrical Corporation submitted its complete EUP, the Large Electrical Corporation may submit the substantive errata directly to the docket. After that time, the Large Electrical Corporation must request permission through written request to the Deputy Director prior to filing a substantive errata.

Nonsubstantive Errata: Nonsubstantive errata are minor corrections to fix typographical and clerical errors, and other obvious, inadvertent errors and omissions. If within the first 30 days after the date on which the Large Electrical Corporation submitted its complete EUP, the Large Electrical Corporation may submit nonsubstantive errata directly to the docket. After 30 days, the Large Electrical Corporation must request permission through written request to the Deputy Director prior to filing a nonsubstantive errata.

Classification of errata as substantive or nonsubstantive is solely within the discretion of Energy Safety.

When submitting errata or a request to submit errata to the Deputy Director, the Large Electrical Corporation must include the following:

a. A cover letter with a summary of the corrections, including:
    i. Whether the Large Electrical Corporation asserts its errata submission is substantive or nonsubstantive;
    ii. The EUP page number, section number, and table or figure number (if applicable) of the corrections;
    iii. A description of the corrections; and
    iv. Reason for the corrections.
b. A redline of the page or pages of the EUP showing the corrections.

If a Large Electrical Corporation submits errata to its EUP, and Energy Safety approves the EUP, the Large Electrical Corporation must submit a final version of its EUP to the docket that includes all previously submitted errata within 10 days of Energy Safety's decision approving

the EUP. This final version must also include changes resulting from a Modification Notice, as further discussed below. A Large Electrical Corporation must not include any other changes in the final version of its EUP, unless otherwise directed by Energy Safety.

Energy Safety may allow for stakeholder comments on substantive errata filed more than 10 days after the date on which the Large Electrical Corporation submitted its complete EUP.

3.5 Modification Notice

Section 8388.5(d)(2) states, "[b]efore approving the plan, the office may require the Large Electrical Corporation to modify the plan." Energy Safety effectuates this provision by issuing a Modification Notice. The purpose of a Modification Notice is to ensure the Large Electrical Corporation addresses plan deficiencies prior to completion of Energy Safety's evaluation.

3.5.1 Examples Warranting a Modification Notice

Energy Safety may issue a Modification Notice after the EUP has been filed. Examples of when Energy Safety may choose to issue a Modification Notice include, but are not limited to, the following issues:

a. The Large Electrical Corporation's submission does not meet the evaluation criteria listed in Section 3.3 of these Guidelines.
b. The Large Electrical Corporation did not provide sufficient information on risk and outage modeling for Energy Safety to determine whether the plan meets the standard outlined in section 8388.5(d)(2).
c. The proposed EUP is not technically feasible within, or proposes timelines beyond, a 10-year planning horizon.
d. The Large Electrical Corporation proposes a Project Acceptance Framework that includes projects that are not located in a Tier 2 or 3 High Fire-Threat District or Wildfire Rebuild Areas.
e. The EUP does not contain a sufficient explanation of common values, assumptions and metrics used for Alternative Mitigation comparisons.
f. One or more proposed threshold, standard, or other metric, when considered in the context of the EUP and risk landscape as a whole, does not satisfy the Plan Mitigation Objective.
g. The EUP contains a Plan Mitigation Objective that, when considered in the context of the EUP and the risk landscape as a whole, does not satisfy the substantial risk reduction required by section 8388.5(d)(2).
h. Correction of EUP content for clarity.
i. The Large Electrical Corporation fails to describe an effective approach to a required element of the EUP, such as the procedure for designation of a Wildfire Rebuild Area.

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j. The Large Electrical Corporation narrative or data submission indicates that future data submissions will not be formatted in a manner that complies with these Guidelines or with the other Energy Safety guidelines.

k. Data submissions are incorrectly formatted or contain miscalculations.

3.5.2 Modification Notice Process

The Modification Notice process is set forth as follows:

a. Energy Safety determines a Large Electrical Corporation's EUP contains one or more deficiencies that warrant a Modification Notice.

b. Energy Safety issues a Modification Notice to the Large Electrical Corporation. The Modification Notice will contain a list of deficiencies the Large Electrical Corporation must address in its Modification Notice Response and applicable schedule or updates to existing schedule.

c. Pursuant to the applicable schedule, the Large Electrical Corporation must resubmit its entire EUP or sections therein, in a redline copy and a clean copy, as directed by the Modification Notice, and provide written responses to each issue delineated in the Modification Notice (Modification Notice Response).

d. If Energy Safety issues a decision approving the Large Electrical Corporation's EUP after issuing one or more Modification Notice, the Large Electrical Corporation must submit, as previously directed in Section 3.2 of these Guidelines, a final version of the EUP that includes changes resulting from all Modification Notices, no later than 10 days after the decision issued. This final version must also include previously submitted errata, as discussed in Section 3.4 of these Guidelines, but must not include any other changes, unless otherwise directed by Energy Safety.

3.6 Public Participation

3.6.1 Docket Access

Persons who wish to receive service of the EUPs, comments on the EUPs, and EUP decisions may enroll by visiting: https://public.govdelivery.com/accounts/CNRA/subscriber/new?topic_id=CNRA_579.

Additional information on Energy Safety's service lists and detailed instructions for signing up can be found at https://energysafety.ca.gov/events-and-meetings/how-to-participate-in public-events/.

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3.6.2 Public Comments

3.6.2.1 Written Public Comments

Any person or entity may submit public comments on EUPs, Modification Notice Responses, and draft decisions. Such comments must be submitted in accordance with the schedule and submission instructions published by Energy Safety.

Energy Safety will accept opening and reply comments on the dates indicated on its published schedule. Energy Safety may publish a revised schedule establishing later deadlines for comments or modify an existing schedule via written notice to the docket. In its discretion, Energy Safety may accept public comment on other submissions or products. Should Energy Safety elect to accept public comment on a product or submission, it will publish a comment schedule and associated procedures via written notice to the docket.

The scope of opening comments must focus on information contained in the document subject to the comment period. The scope of reply comments is limited to the issues raised in opening comments. New information not directly related to issues presented in opening comments will not be considered. Energy Safety may reject comments submitted after the due dates provided within a schedule or comments that are not within the scope as described in this section. Page limits for both opening and reply comments will be addressed in Energy Safety's published schedule.

Any person or entity seeking an extension to a public comment due date may email a request to Energy Safety at ElectricalUndergroundingPlans@energysafety.ca.gov. The request must include:

a. Original deadline,
b. Document subject to the comment period,
c. Good cause for the extension, and
d. Proposed new deadline in lieu of the original.

Any extension request must be received by Energy Safety by 5:00 p.m. Pacific time two days prior to the original comment due date.

For any technical issues encountered that may affect the timeliness of a public comment submission, the person or entity submitting the comment must immediately contact efiling@energysafety.ca.gov and ElectricalUndergroundingPlans@energysafety.ca.gov.

Energy Safety will consider public comments before issuing a decision. When a comment is received, it becomes public record and will be made available to the public on the Energy Safety docket. The comments will be posted as received without redaction of personal information. Energy Safety is not required to respond to public comments directly.

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3.6.2.2 Workshops

Energy Safety may hold one or more public workshops to discuss part or all of a submitted EUP or any other document or product submitted by the Large Electrical Corporation. Energy Safety will provide notice of the workshop via written notice to the docket.

3.6.3 Submitting Public Comments

Public comments must conform to the following requirements:

a. Comments must be submitted to the related docket on Energy Safety's e-filing system.
b. Comments on a Large Electrical Corporation's EUP shall be named according to the naming convention set forth in these Guidelines. However, comments shall include the organization or person's name followed by "Opening Comments" or "Reply Comments" and then the relevant abbreviations.
c. See Section 3.9 of these Guidelines for document accessibility requirements.
d. The submission process for confidential information is set forth in section 29200 of Title 14 of the California Code of Regulations.

3.7 Data Requests

3.7.1 Data Requests from Energy Safety

Energy Safety may obtain any information from a Large Electrical Corporation that is relevant to a matter within the scope of Energy Safety's authority or is likely to lead to the discovery of relevant information, via a data request.

The following applies to data requests:

a. Data requests from Energy Safety staff to a Large Electrical Corporation may come from ElectricalUndergroundingPlans@energysafety.ca.gov or from individual Energy Safety staff e-mail addresses. All responses to Energy Safety data requests must be submitted to the appropriate EUP docket. A Large Electrical Corporation must endeavor to submit one file per data request to the docket (as opposed to a file for every question in the data request).
b. The "Data Request Response Period" for an EUP begins on the date a Large Electrical Corporation submits its EUP for the pre-submission check and continues until issuance of a decision for the Large Electrical Corporation. The "Data Request Response Period" for Progress Reports is the initial 60 days after a Large Electrical Corporation submits a Progress Report.

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c. Data requests issued by Energy Safety during the Data Request Response Period are subject to a three-business day response period. Data requests issued by Energy Safety outside of the Data Request Response Period are subject to a ten-calendar day response period unless a different response period is provided by Energy Safety.

d. For data requests submitted by 5:00 p.m. on a business day, the date of submission is Day 0. For data requests submitted after 5:00 p.m. Pacific time or on a Saturday, Sunday, holiday, or other day when Energy Safety offices are closed, the next business day is Day 0.

e. Unless a different response time is provided by Energy Safety, a Large Electrical Corporation must respond to all data requests by 5:00 p.m., on day three, with each business day counted as one day.

f. Extension Requests

i. If a Large Electrical Corporation seeks a longer response period than provided in this section or as provided by Energy Safety, the Large Electrical Corporation must request an extension by sending an extension request to ElectricalUndergroundingPlans@energysafety.ca.gov and to the assigned Energy Safety staff lead for the Large Electrical Corporation's EUP evaluation.

ii. An extension request must include:

- The data request or portion of the data request requiring an extension;
- Good cause for the extension;
- A proposed date of response in lieu of the original deadline; and

iii. Only material related to the extension request will be considered for a new date; remaining questions not in dispute will maintain the original deadline; and

iv. Any extension request must be received by Energy Safety by 5:00 p.m. Pacific time one business day prior to the original data request response due date.

3.7.2 Data Requests from Data Request Stakeholders

A Data Request Stakeholder may obtain, through a data request to the Large Electrical Corporation, information related to any EUP docket matter with a comment period specified in these Guidelines or for which Energy Safety has published a comment schedule.

Prior to issuing a data request, a person or entity must seek and obtain designation as a Data Request Stakeholder pursuant to these Guidelines. A person or entity may submit public comments without designation as a Data Request Stakeholder.

3.7.2.1 Data Request Stakeholder Designation

Any person or entity must submit a request for and receive designation as a Data Request Stakeholder prior to sending data requests. The request must be made within ten days after

the Large Electrical Corporation submits a EUP. Energy Safety may grant late requests for designation as a Data Request Stakeholder only on a showing of good cause by the interested person or entity.

A request for designation as a Data Request Stakeholder must include:

a. The docket matter (Docket #) the person or entity intends to participate in (e.g., #2024-EUPs);
b. The position and interest of the person in the EUP docket matter;
c. Disclosure of the persons or entities on whose behalf the person may be seeking the designation, if any;
d. The Large Electrical Corporation for which the person or entity seeks Data Request Stakeholder status; and
e. The name, mailing address, e-mail address, and telephone number of the person or entity designee.

A request for designation as a Data Request Stakeholder will be considered approved five business days after submission without any further correspondence from Energy Safety unless the person or entity seeking the designation is otherwise notified by Energy Safety during that time. Once granted designation as a Data Request Stakeholder, a person or entity retains that designation until Energy Safety has issued a decision on the EUP.

3.7.2.2 Data Request Process for Data Request Stakeholders

The following applies to data requests from Data Request Stakeholders:

a. Data Request Stakeholders may issue data requests to a Large Electrical Corporation beginning on the date on which the Large Electrical Corporation submitted its complete EUP and ending when Energy Safety has issued a decision.
b. A Large Electrical Corporation must respond to all stakeholder data requests within three-business days of the request, unless a different response period is mutually agreed upon by the stakeholder making the data request and the Large Electrical Corporation.
c. Extension Requests
    i. Prior to seeking an extension from Energy Safety to respond to a data request, a Large Electrical Corporation must first make a good-faith effort to ask the stakeholder making the request to agree to the extension.
    ii. If a Large Electrical Corporation cannot reach an agreement with the stakeholder making the request, the Large Electrical Corporation must request an extension by sending an extension request to ElectricalUndergroundingPlans@energysafety.ca.gov.

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iii. An extension request must include:

- A showing of a good-faith effort by the Large Electrical Corporation to ask the stakeholder to agree to the extension and the result of such effort;
- The data request or portion of the data request requiring an extension;
- Good cause for the extension; and
- A proposed date of response in lieu of the original deadline.

iv. Any extension request must be received by Energy Safety by 5:00 p.m. Pacific time one business day prior to the date the data request response is due.

3.7.2.3 Data Request Requirements for Data Request Stakeholders

a. Data requests must seek information relevant to the pending docket matter and be designed to facilitate the stakeholder's ability to make an informed public comment.

b. Stakeholders submitting data requests must consider the volume and nature of the data being requested when negotiating response deadlines. In the event that the information requested is already available in WMP filings, the Large Electrical Corporation may choose to refer the stakeholder to the specific part of the WMP record where the information can be found.

c. Prior to submitting data requests, the Data Request Stakeholder must make a reasonable effort to determine if the information is already available, or has already been requested, through any of the following:

i. Contained in the Large Electrical Corporations' EUP or WMP submission, or

ii. Previously requested by Energy Safety, or

iii. Previously requested by other Data Request Stakeholders.

Data Request Stakeholders may view prior data requests and responses in each Large Electrical Corporation's Data Request Log, available on the Large Electrical Corporation's website.

3.7.2.4 Request to Compel or Limit Data Request Stakeholder Data Requests

Data Request Stakeholders and the Large Electrical Corporation must endeavor to resolve all data request disputes amongst themselves. For data request disputes that cannot be resolved, parties to the dispute may seek relief in accordance with the process below:

a. Prior to filing a request to compel or limit data requests, the parties to the dispute must have previously met and conferred in a good faith effort to informally resolve the dispute.

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b. The party seeking to compel or to limit data requests bears the burden of proving the reasons why Energy Safety should compel or limit the data request.

c. A request to compel or limit a data request must include:

   i. Facts showing a good faith attempt at an informal resolution of the data request dispute presented by the request;

   ii. The data request or portion of the data request at issue;

   iii. Basis to compel or limit the data request; and

   iv. A proposed determination that clearly indicates the relief requested.

d. A response from a Data Request Stakeholder or Large Electrical Corporation must be submitted within three business days of the date that the request was submitted to Energy Safety. If no response is submitted to a request to compel or limit a data request, then the request will be deemed granted. Energy Safety will take requests to compel or limit a data request under consideration and will issue a determination on a request to compel or limit a data request after the request and response have been submitted. Energy Safety may request clarification or additional information from the parties to the dispute prior to issuing a determination. Responses to such requests for clarification or additional information must be submitted within three business days of the date of the request.

All filings for a request to compel or limit data requests must be submitted to Energy Safety at ElectricalUndergroundingPlans@energysafety.ca.gov and served to all parties to the dispute.

3.8 Document Maintenance

3.8.1 Document Postings

When submitting an EUP, the Large Electrical Corporation must post its EUP, all documents referenced in its EUP, and any subsequent versions of the EUP and documents on a EUP-specific website in an easy-to-follow format. This will be in addition to the posting of EUPs on Energy Safety's docket and website. A Large Electrical Corporation must include the website address in its EUP submission cover letter. All documents submitted to the Energy Safety docket, including responses to data requests, must be machine readable and searchable.

3.8.2 Data Request Log

Each Large Electrical Corporation that submits an EUP must post an EUP Data Request Log on its website.

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The EUP Data Request Log must be posted and maintained beginning on the date on which the Large Electrical Corporation submitted its complete EUP and ending upon the completion of each Large Electrical Corporation's 10-Year EUP. Each participating Large Electrical Corporation must also submit to Energy Safety a Data Request Log weekly for the same period. The Large Electrical Corporation is not required to submit a weekly Data Request Log to Energy Safety if there is no new information to report. The requirements for each Data Request Log are set forth as follows.

a. Each Large Electrical Corporation must update its EUP Data Request Log and post all data requests and responses issued to-date weekly each Thursday by 5:00 p.m. Pacific time.
b. Each Large Electrical Corporation must submit to Energy Safety its EUP Data Request Log each Thursday by 5:00 p.m. Pacific time to the appropriate EUP docket.
c. The website or portion of webpage pertaining to data requests must be titled "[EC corporate name] Electrical Undergrounding Plan Data Requests."
d. The Data Request Log must be in the form of a searchable online table that contains all data requests, responses for each data request received, and links to relevant documents.
e. The Data Request Log must indicate:
    i. The attachment number of any additional attachments related to the data request,
    ii. The relevant sections of the EUP, and
    iii. A thematic category and subcategory of the data request.

3.9 Accessibility

It is the policy of the State of California that electronic information be accessible to people with disabilities. Each person who submits information through Energy Safety e-filing system must ensure that the information complies with the accessibility requirements set forth in Government Code section 7405. Energy Safety will not accept any information submitted through the e-filing system that does not comply with these requirements.[14]

[14] References to laws and regulations related to digital accessibility are available at https://dor.ca.gov/Home/DisabilityLawsandRegulations. Resources on constructing accessible electronic contents are available at https://dor.ca.gov/Home/HowToCreateAccessibleContent.

3.10 Computation of Time and Scheduling

When requirements referenced in these Guidelines set a time limit for performance of an act, the time is computed by excluding the first day (i.e., the day of the act or event from which the designated time begins to run) and including the last day. If the last day falls on a Saturday, Sunday, holiday, or other day when Energy Safety offices are closed, the time limit is extended to include the first day thereafter. If an act occurs after 5:00 p.m. Pacific time, it is deemed as having been performed on the next day.

Energy Safety may modify any schedule outlined in these Guidelines by issuing further scheduling guidance. Additional schedule guidance will take precedence over any scheduling included in these Guidelines.

All instances of specified days in this document are assumed to be defined as calendar days unless otherwise noted.

3.11 Submission Instructions, Locations, and Naming Conventions

Electronic file names for the EUPs, associated text documents, and narrative reports must follow the standardized electronic naming convention illustrated in Table 8 below. The electronic file name must include, in order, the naming convention identified in each column (without quotation marks) with an underscore between the character string of each column. All text files must be submitted in portable document format (pdf).

See examples below.

Examples:

a. First Version of an EUP Submission: “2025-02-05_PGE_2023_EUP_R0.pdf”, which would refer to the first version of an EUP submitted by PG&E on February 05, 2025.
b. Updated submission in response to Energy Safety Modification Notices: “2025-06-05_SDGE_2023_MNR_R1”, which would refer to a Modification Notice Response submitted by SDG&E on June 5, 2025, mod 1.

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Table 8. Electronic File Naming Convention for Text Files with Examples

Date Submitted (Year-Month-Day)	Large Electrical Corporation Abbreviated Name	Document Year	Document Type	Modification Number
"2023-02-05"	• "PGE" (Pacific Gas and Electric Company) • "SDGE" (San Diego Gas & Electric Company) • "SCE" (Southern California Edison Company)		• "EUPPRE" (Electrical Undergrounding Plan Submission for Pre Submission Review) • "EUP" (Electrical Undergrounding Plan Submission) • "PR#" (Semi-Annual Progress Report) • "MNR" (Mod Notice Response) • "DRLOG" (Data Request Log) • "MR" (Model Report) • "EUPOC" (Electrical Undergrounding Plan Opening Comments) • "EUPRC" (Electrical Undergrounding Plan Reply Comments) • "EUPDDOC" (Electrical Undergrounding Plan Draft Decision Opening Comments)	• R0 (First Version) • R1 (Mod 1) • R2 (Mod 2)

Date Submitted (Year-Month-Day)	Large Electrical Corporation Abbreviated Name	Document Year	Document Type	Modification Number
			• "EUPDDRC" (Electrical Undergrounding Plan Draft Decision Reply Comments) • "EUPERR" (Electrical Undergrounding Plan Errata) • "EUPERRC" (Electrical Undergrounding Plan Errata Comments)	

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Electronic file names for the associated tabular and special data submissions must follow the standardized electronic naming convention illustrated in Table 9 below. More detail on the data submissions can be found in Appendix C.

Table 9. Electronic File Naming Convention for Data Submissions

Submission Type	File Type	Submission Location	Naming Convention
Initial Tabular Data	CSV	eFiling	"[Electrical Corporation Abbreviation]_Intial_T#_Date_R#", *for example:* "PGE_Initial_2024-01-01_T1_R0.csv"
Progress Report Tabular Data	CSV	eFiling	"[Electrical Corporation Abbreviation]_PR#_T#_Date_R#", *for example:* "PGE_PR1_2025-01-01_T1_R0.csv"
Project Variable Modifiers Information	JSON	eFiling	"[Electrical Corporation Abbreviation]_PR#_Date_PMV_R#", *for example:* "PGE_PR1_2025-01-01_PMV_R0.json"
Model Risk Landscapes for Projects	JSON	eFiling	"[Electrical Corporation Abbreviation]_PR#_Date_R#", *for example:* "PGE_PR1_2025-01-01_Projects_R0.json"
Initial Geodatabase Submission	Zip	Assigned SharePoint	"[Electrical Corporation Abbreviation]_Intial_Date_R#", *for example:* "PGE_Initial_2024-01-01_R0.gdb.zip"
Progress Report Geodatabase Submission	Zip	Assigned SharePoint	"[Electrical Corporation Abbreviation]_PR#_Date_R#", *for example:* "PGE_PR1_2025-01-01_R0.gdb.zip"

4. Compliance

4.1 Progress Reports

Section 8388.5(f) requires that, once an EUP is approved by Energy Safety and the CPUC, the Large Electrical Corporation must file a Progress Report with Energy Safety and the CPUC every six months.

The requirements of these Progress Reports will be informed by the content, format, and structure of Progress Report 0 as detailed in Section 2.6. Energy Safety may permit comments on future Progress Reports. Energy Safety will issue additional Guidelines on this topic and other post-approval matters.

4.2 Independent Monitor Report

Section 8388.5(f) requires that, once an EUP is approved by Energy Safety and the CPUC, an Independent Monitor must provide an annual report to Energy Safety for each year the EUP is in effect. Energy Safety will issue additional Guidelines on this topic and other post-approval matters.

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APPENDICES



Appendix A. Definitions

Unless otherwise expressly stated, the following words and terms, for the purposes of these Guidelines, have the meanings shown in this section.

"10-Year Electrical Undergrounding Program" means "an expedited utility distribution infrastructure undergrounding program" established by the CPUC pursuant to section 8388.5(a).

"Ablation Analysis" means the effects of a Portfolio if a single project is taken out of the Portfolio. It reports these effects at both the Project-Level and Portfolio-Level.

"Alternative Mitigation" means a mitigation strategy, other than undergrounding, used to reduce the consequence or likelihood of wildfires and Outage Program Events on a particular Circuit Segment.

"Baseline" means the expected risk and reliability profile of the Large Electrical Corporation's existing distribution system assuming that no Undergrounding Projects from the EUP program are constructed during the asset life cycle. The Baseline includes all previously approved Undergrounding Projects, system-hardening projects, and similar mitigation activities.

"Circuit" means a combination of all Circuit Segments that are fed from the same substation circuit breaker.

"Circuit Segment" means an isolatable circuit segment.

"Collective Analysis" means the effects of a single Undergrounding Project, in combination with the rest of the projects that are in the Portfolio. The Collective Analysis reports these effects on the Project-Level as well as the Portfolio-Level.

"Confirmed Project" means an Undergrounding Project that has completed Screen 3 (Project Risk Analysis).

"Confirmed Project Polygon" means a special boundary generated at the beginning of Screen 3 that encompasses the entire Eligible Circuit Segment on which the Undergrounding Project is defined, except any sections already contained in another Confirmed Project Polygon.

"Core Capabilities" means the required use-cases that the Large Electrical Corporation's Risk Modeling Methodology must be able to achieve in order to make quantitative arguments about the risk reduction of Undergrounding and Alternative Mitigations.

"CPUC CBR" means the cost-benefit ratio produced by the cost-benefit approach adopted in the CPUC's Decision 22-12-027 (as modified by any subsequent decision).

"CPUC Data Appendix 1" means the final adopted version of "Appendix 1: SB 884 Project List Data Requirements-Preliminary" to the SB 884 Program CPUC Guidelines dated March 7, 2024, and adopted by the CPUC in Resolution SPD-15.

"Data Request Response Period" means the period of time during which Energy Safety data requests automatically have a three-day response time unless otherwise specified by Energy Safety.

"Data Request Stakeholder" means a stakeholder who has requested and obtained Data Request Stakeholder in accordance with Section 3.7.2.

"Deenergization Event" has the meaning given in section 8385(a)(2) ("the proactive interruption of electrical service for the purpose of mitigating or avoiding the risk of causing a wildfire"). See also **"Outage Program."**

"Electrical Corporation" has the same meaning as set forth in section 218 of the California Public Utilities Code.

"Electrical Undergrounding Plan" or **"EUP"** means a plan submitted pursuant to section 8388.5.

"Eligible Circuit Segment" means a Circuit Segment that falls within the risk score values that will be used to identify high risk Circuit Segments that are eligible for the 10-Year Electrical Undergrounding Program.

"GO 95" means CPUC General Order 95 (Rules for Overhead Line Construction).

"GO 128" means CPUC General Order 128 (Rules for Construction of Underground Electric Supply and Communication Systems).

"HFTD" or **"High Fire-Threat District"** means areas of the state designated by the CPUC as having elevated wildfire risk, where each Electrical Corporation must take additional action to mitigate wildfire risk pursuant to Decision 17-01-009 or its successor.

"High Frequency Outage Program Project-Level Standard" is the minimum decrease in Outage Program Likelihood as measured through formal calculations of the Key Decision-Making Metrics that any Undergrounding Project considered under the High Frequency Outage Program must achieve to meet the required substantial increase in electrical reliability achieved by reducing the use of Public Safety Power Shutoffs, Enhanced Powerline Safety Settings, deenergization events, and any other outage programs.

"High Frequency Outage Program Threshold" is the measure of likelihood above which is considered to have a significantly high likelihood of frequent or prolonged disruption of service to customers. This threshold must measure both likelihood of an Outage Program Event and its anticipated length. This threshold must represent less than 1% of Circuit Segments in the entire system by mile and no more than 10% of Outage Program Likelihood by score.

"High-Risk Threshold" means the Overall Utility Risk level above which a Circuit Segment is considered eligible for examination for expedited undergrounding.

"High-Risk Project-Level Standard" is the minimum decrease in Ignition Risk and Outage Program Risk, that an Undergrounding Project must achieve to support the Plan Mitigation Objective. This reduction in wildfire risk and increase in reliability must, at minimum, reduce the risk of the Circuit Segment to below the Mitigated Risk Threshold.

"Ignition Consequence" means the total anticipated adverse effects from a wildfire on each community it reaches. This metric considers the wildfire hazard intensity, the wildfire exposure potential, and the inherent wildfire vulnerabilities of communities at risk.

"Ignition Likelihood" means the likelihood of an ignition at a given location given a probabilistic set of environmental conditions. This is an unweighted and unscaled calculation.

"Ignition Risk" means the measure of impacts from wildfire at a given location. This metric is the product of two factors: (1) the likelihood a wildfire will occur, and (2) the potential consequences of a wildfire originating from this location.

"Ignition Risk Decrease Standard" is the minimum decrease in Ignition related metrics, as measured through formal calculations of the Key Decision-Making Metrics across the entire system at both the System-Level and Portfolio-Level that the EUP must achieve to meet the required decrease in wildfire risk.

"Ignition Tail Risk Threshold" is the measure of consequence above which a Circuit Segment is considered to have significant potential for catastrophic wildfire, that it merits special consideration. This threshold must represent less than 1% of Circuit Segments in the entire system by mile and no more than 10% of the wildfire consequence by score.

"In-Area Circuit Segment" means a Circuit Segment located within the Large Electrical Corporation's service territory that is located in a Tier 2 or 3 High Fire-Threat District or a Wildfire Rebuild Area.

"Independent Monitor" means the independent monitor selected by Energy Safety and hired by the Large Electrical Corporation per section 8388.5(f)(3).

"JSON" or **"JavaScript Object Notation"** is a data file type designed to track unstructured data that would not be appropriate for a spreadsheet format.

"Key Decision-Making Metric" or **"KDMM"** means the key decision-making metrics developed pursuant to Section 2.7.3 of these Guidelines.

"Large Electrical Corporation" has the meaning given in section 3280 of the California Public Utilities Code ("an electrical corporation with 250,000 or more customer accounts within the state.")

"Mitigated Risk Threshold" is the combined measure of Ignition Risk and Outage Program Risk below which a Circuit Segment is considered to be of acceptable risk.

"Model Risk Landscape" or **"MRL"** means the model risk landscape defined for the EUP pursuant to Section 2.7.4 of these Guidelines.

"Modification Notice" means the notice issued by Energy Safety if Energy Safety requires changes to an EUP before approving an EUP.

"Modification Notice Response" means the written response of the Large Electrical Corporation to a Modification Notice.

"Non-EUP Project" means a distribution undergrounding or other system hardening project in a Tier 2 or 3 High Fire Threat District that is funded or in the Project Planning and Construction Phases, that is not included in the 10-Year EUP.

"Out of Area Circuit Segment" means a Circuit Segment located within the Large Electrical Corporation's service territory that is not located in a Tier 2 or 3 High Fire-Threat District or a Wildfire Rebuild Area.

"Outage Program" means (i) any program that interrupts electrical service for the purpose of mitigating or avoiding the risk of causing a wildfire including Public Safety Power Shutoff (PSPS) programs, fast trip settings (including enhanced powerline safety settings, Fast Curve Settings, and Sensitive Relay Profile) and similar programs, and (ii) any program that could result in a deenergization event. Outage Programs exclude maintenance outages and other outages not related to reducing wildfire risk.

"Outage Program Consequence" is the total anticipated adverse effects from an Outage Program for a community. This considers the Outage Program exposure potential and inherent Outage Program vulnerabilities of communities at risk.

"Outage Program Event" means an outage that results from an Outage Program.

"Outage Program Likelihood" is the likelihood of a Large Electrical Corporation utilizing an Outage Program given a probabilistic set of environmental conditions.

"Outage Program Risk" is the measure of reliability impacts from Outage Programs at a given location. This metric is the product of two factors: (1) the likelihood an Outage Program Event will be required due to environmental conditions exceeding design conditions, and (2) the potential consequences of the Outage Program for affected customers, considering exposure potential and vulnerability. This is an unweighted and unscaled calculation.

"Overall Utility Risk" is defined as the combined measure of Ignition Risk and Outage Program Risk that measures the total risk of wildfires and Outage Program Events related to wildfire risks. This is computed as the inner product of the likelihoods of adverse events and their consequences. This is an unweighted and unscaled calculation.

"Plan Mitigation Objective" means the amount of change in risk (wildfire and reliability) that is necessary to meet the requirements contained in section 8388.5(d)(2).

"Plan Tracking Objectives" are forward-looking, quantifiable measurements and objectives, measured at the Portfolio-Level and System-Level, used to assess progress toward the Plan Mitigation Objective.

"Portfolio" means the set of all Confirmed Projects at Screen 3 or later. A Portfolio is a unique list of Confirmed Projects, and adding or removing Confirmed Projects from the list constitutes an update to the Portfolio and must be indicated with a new portfolio ID.

"Portfolio-Level" refers to a measurement that accumulates information from every Circuit Segment on a Circuit which has one or more Confirmed Projects as well as the effects of Confirmed Projects on the overall Circuit into a single number.

"Portfolio-Level Standards" means the Ignition Risk Decrease Standard and the Reliability Increase Standard.

"Pre-Wildfire" refers to the most recently modelled undamaged distribution infrastructure and the associated risk modeling of distribution infrastructure damaged by wildfire within a Wildfire Rebuild Area.

"**Prioritized Project**" means an Undergrounding Project that has passed Screen 4 (Prioritization and Finalization).

"Project Acceptance Framework" means the multi-step process, described in Section 2.4 of these Guidelines, that the Large Electrical Corporation will use to create the list of Undergrounding Projects pursuant to section 8388.5(c)(2), to select Undergrounding Projects for construction, and to maintain and update the Circuit Segment Information Lists throughout the EUP 10-year period.

"Project Construction Completed Phase" is the Project Planning and Construction Phase when the Undergrounding Project is completed, but before the overhead line is deenergized.

"Project Overhead De-Energization Phase" is the Project Planning and Construction Phase when the Undergrounding Project is completed and the overhead line it replaced or upgraded has been deenergized.

"Project-Level" refers to a measurement that accumulates risk from all of the equipment on a single Circuit Segment into a single number.

"Project-Level Standards" means the High-Risk Project-Level Standard, the High Frequency Outage Program Project-Level Standard, and the Tail Risk Project-Level Standard.

"Project-Level Thresholds" means the High-Risk Threshold, Ignition Tail Risk Threshold, High Frequency Outage Program Threshold, and Mitigated Risk Threshold.

"Project Planning and Construction Phases" means the status categories for projects as listed in CPUC Data Appendix 1, as well as two additional phases defined by Energy Safety.

The five phases designated and defined by the CPUC are: (1) Project Scoping, (2) Project Designing/Estimating, (3) Project Permitting/Dependency, (4) Project Ready for Construction, and (5) Project Construction In Progress, and the two additional phases that Energy Safety has designated and defined are: (6) Project Construction Completed and (7) Project Overhead De-energization.

"PSPS" means Public Safety Power Shutoff. See also "**Outage Program**."

"PVM" or **"Project Variable Modifier"** means a set of changes that are made to variables in the Risk Modeling Methodology to evaluate the effectiveness of a given project or set of projects and represents how the Large Electrical Corporation values the efficacy of the Alternative Mitigations.

"Reliability Increase Standard" is the minimum decrease in Outage Program-related metrics, as measured through formal calculations of the Key Decision-Making Metrics across the entire system at both the System-Level and Portfolio-Level, that the EUP must achieve to meet the required increase in reliability.

"Risk Landscape" means the set of metrics the Large Electrical Corporation uses to estimate the risks.

"Risk Modeling Methodology" means the collection of numerical models and algorithms that the Large Electrical Corporation employs to approximate the likelihood and consequences of utility related wildfires and wildfire related Outage Programs.

"Separate Analysis" means the risk reduction of the Undergrounding Project if it was the only project in the Portfolio. Effects must be reported at the Project-Level and Portfolio-Level.

"Subproject" means a delimited portion of work on a Confirmed Project. A Subproject must have a uniform set of mitigations applied to the entire Subproject. If a project does not have a uniform set of mitigations, it must be divided into more Subprojects.

"System-Level" refers to a measurement that accumulates information from the entire electrical distribution system into a single number.

"Tail Risk Project-Level Standard" is the minimum decrease in wildfire likelihood that any Undergrounding Project considered under the Ignition Tail Risk Threshold must achieve to meet the required substantial reduction of the risk of wildfire.

"Target/Timeline Table" means the table, described in Subsection 2.3.1 setting forth project timelines and targets that are required to fulfill section 8388.5(c)(3).

"Undergrounding" means actions taken to convert overhead distribution lines and/or equipment to underground distribution lines and/or equipment in accordance with GO 128 and includes all Undergrounding Support Work.

"Undergrounding Project" means an Eligible Circuit Segment that has completed Screen 2 including the CPUC Data Appendix 1 information completed.

"Undergrounding Subproject" means a Subproject that is comprised of only Undergrounding activities including the Undergrounding Support Work necessary to complete the Undergrounding Subproject.

"Undergrounding Support Work" means the work done in direct support of Undergrounding distribution lines. This includes work and equipment that (i) directly facilitates Undergrounding lines, (ii) transitions between overhead and underground lines, or (iii) is required by construction or design standards or GO 95. This may include the construction of no more than three new distribution poles on either end of an undergrounded portion of distribution line if they are necessary to facilitate the safe transition from overhead to underground.

"Wildfire Rebuild Area" means a location where distribution infrastructure has been damaged by wildfire that is specifically identified by the Large Electrical Corporation in the EUP or in a Progress Report.

"WMP" means the wildfire mitigation plan program and requirements mandated by sections 8385 through 8389.

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Appendix B. Organization of EUP

The purpose of this appendix is to assist in the organization of an EUP. This appendix is not a comprehensive enumeration or a modification of existing requirements outlined in the EUP Guidelines.

B.1 Narrative Content

The EUP must include a main document, including narrative and tables, organized into chapters as follows and submitted to the docket following the instructions in Section 3 of the Guidelines. The narrative includes tables appropriate in size and content for a narrative document. The tabular data required for the data submission is detailed in Section B.3 below.

Chapter 1 Basic Information

Required Content	Description of Required Narrative Content
Basic Information	See Section 2.2 of these Guidelines.

Chapter 2 Narrative Requirements for Demonstration of Substantial Risk Reduction

Required Content	Description of Required Narrative Content
Plan Mitigation Objective: Narrative and Implementation Approach	See Section 2.3.1 of these Guidelines.
Target/Timeline Table	See Table 1 in Section 2.3.1 for example.
Plan Tracking Objectives	See Section 2.3.2 of these Guidelines.
Risk Calculations	See Sections 2.3.3, 2.3.4, and 2.3.5 of these Guidelines

Chapter 3 Narrative Requirements for Project Acceptance Framework

Required Content	Description of Required Narrative Content
Incorporating Changes to Circuit Segment Information including Subprojects	See Section 2.4.2 of these Guidelines
Screen 1: Circuit Segment Eligibility	See Section 2.4.3 of these Guidelines
List of Top 20 highest Circuit Segment scores for Overall Utility Risk, Ignition Consequence, and Outage Program Likelihood	See Section 2.4.3.1 of these Guidelines
Screen 2: Project Information and Alternative Mitigation Comparison	See Section 2.4.4 of these Guidelines
Screen 2 Common Set of Values and Assumptions	See Section 2.4.4.1 of these Guidelines.
Screen 3: Project Risk Analysis	See Section 2.4.5 of these Guidelines
Screen 3 Requirement for 25 individual Undergrounding Projects	See Section 2.4.5.2 of these Guidelines.
Screen 4: Project Prioritization	See Section 2.4.6 of these Guidelines

Chapter 4 Narrative Requirements for Circuit Segment Information Lists

Most of the Circuit Segment Information Lists will be submitted as part of the tabular data submission. A narrative describing how the tabular data can be combined and sorted to create the required Circuit Segment Information Lists. Shorter versions of key Circuit

Segment Information Lists (for example, a list of the top 25 highest risk Circuit Segments) can be included in this chapter to provide an overview.

Required Content	Description of Required Narrative Content
Narrative describing Circuit Segment Information Lists	See Section 2.4.7.1 of these Guidelines for narrative content.
Narrative describing Non-EUP projects and programs	See Section 2.4.7.2 of these Guidelines

Chapter 5 Project Timelines, Workforce Development Plan, Costs and Benefits, and Non-Ratepayer Funding Sources

Required Content	Description of Required Narrative Content
Project Timeline and Targets	See Table 1, Section 2.3.1 and Section 2.5.1 of these Guidelines; section 8388.5(c)(3)
Workforce Development Plan	See Section 2.5.2 of these Guidelines; section 8388.5(c)(5)
Costs and Benefits	See Section 2.5.3 of these Guidelines; section 8388.5(c)(6)
Nonratepayer Funding Sources	See Section 2.5.4 of these Guidelines

Chapter 6 Narrative Requirements for Progress Report 0

Required Content	Description of Required Narrative Content
Narrative about Progress Report 0 and in support of Progress Report 0	See Section 2.6 of these Guidelines Note: the actual Progress Report 0 narrative is submitted as a separate document attached to the Narrative Content document.

Chapter 7 Narrative Support for Risk Modeling Methodology

Section Name	Narrative Requirements	Maximum Length of Narrative Section	Required Tables and Figures	Table Requirements
Overview	See 2.7.1	5 Pages	Enterprise Diagram(s)	See 2.7.3.1
Model Report	See 2.7.2	4 Pages per Model	None	None
Core Capabilities	See 2.7.5	2 Pages per Capability	None	None
Model Inputs	See 2.7.5.1	1 Page per Input Category	Model Risk Landscape Variables Table	See 2.8.5.1
Project Variable Modifiers	See 2.7.7	1 Page per Project Variable Modifier	Project Variable Modifiers Inputs Table Project Variable Modifiers Outputs Table	See 2.8.5.2
Calibration and Versioning	See 2.7.5.2 and 2.7.6	2 Pages	None	None
Key Decision-Making Metrics	See 2.7.3	3 Pages for required KDMMs and up to 1 Page each for up to 5 additional KDMMs	None	None
Portfolio-Level Standards	See 2.7.8	2 Pages	None	None
Project-Level Thresholds	See 2.7.9.1	2 Pages	None	None
Project-Level Standards	See 2.7.9.2	2 Pages	None	None

Chapter 8 Narrative for Baseline, Backtesting, Model Retention and Subsequent Model Reports

Required Content	Description of Required Narrative Content
Models and Calibration Retention Policies	See Section 2.7.6
Plan to Update Risk Modeling	See Section 2.7.6

Chapter 9 Comparative Metrics for Alternative Mitigations

Required Content	Description of Required Narrative Content
Comparative Metrics	See 2.7.10

Chapter 10 Narrative Requirements for Reporting Metrics

Provide any narrative to support Section 2.8 of these Guidelines regarding submission of Tabular Data, JSON Data, Spatial Data Reporting, and Data Validation

B.2 Progress Report 0

Progress Report 0 must be submitted as a separate attachment to the EUP.

Required Content	Description
Portfolio Coversheet	See 2.8.6 of these Guidelines
Plan Mitigation Objective	See 2.3.1 of these Guidelines
Plan Tracking Objectives	See 2.3.2 of these Guidelines
Target/Timeline Table	See 2.3.1(j) of these Guidelines
Identified Wildfire Rebuild Areas	See 2.4.3.1 of these Guidelines

Current Model Report	See 2.7.2 of these Guidelines
Data Submission	All data required pursuant to Section 2.8 and Appendix C of these Guidelines
Alternative Mitigation Selection Process	See 2.4.4.1 of these Guidelines
Additional Content (mandatory)	Energy Safety may direct the Large Electrical Corporation to include specific additional content in Progress Report 0.
Additional Content (optional)	Additional content that the Large Electrical Corporation proposes to track in its Progress Reports

B.3 Data Submissions

Instructions on the format for data submissions are found in Appendix C of these Guidelines.

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Appendix C. Data Organization & Structure

The purpose of this appendix is to summarize all the information needed for the data submission accompanying the EUP and during all Progress Reports.

C.1 Tabular Data Submissions

This appendix establishes the requirements for the tabular data submission. The submission of the tabular data must map to the submission of the spatial data for both the initial EUP submission and every subsequent Progress Report. The data submission accompanying the initial EUP submission will have the same format as the Progress Reports, so it is referred to in this document as Progress Report 0.

The submission of tabular data must encompass the tables set forth in this appendix. Template files to aid in submission of the data requirements are available on Energy Safety's website. The format of these files is in the form of ".CSV" or comma-separated values files.

Tables C.6 through C.14 are anchored around uniquely identifiable Circuit Segments with unique IDs. The Circuit Segment IDs are required to be unique not only spatially (e.g. no repeated IDs in the system at a particular time) but also temporally (e.g. if a new Circuit Segment is created in Progress Report 1, it must not use an ID found in Progress Report 0). If the Large Electrical Corporation's Circuit Segment naming schema would reuse Circuit Segment IDs, it must append the "minting date," or the date of submission of the first Progress Report in which this Circuit Segment appears, to the end of the Circuit Segment name as an 8-digit date string (e.g. "July 1, 2025" as "20250701").

A Circuit Segment is considered "new", and requires a new Circuit Segment ID, if any of the individual pieces of equipment that define the boundaries of where the Circuit Segment connects to other Circuit Segments or substations (e.g. circuit breakers, reclosers, and other equipment), are removed, are added, or if any of that equipment moves to a new spatial location. However, a Circuit Segment is not considered "new" just because there is any other maintenance, changes to non-terminal equipment, swapping out or upgrading terminal equipment without moving it, changes to the length, or movement of non-connecting endpoints (e.g. the last customer meter on a line). Changes which create "new" Circuit Segments will be tracked in the Circuit Segment Changelog Table.

C.1.1 Plan Table

This section establishes the requirements for a Plan Table. This table is submitted once in Progress Report 0 but not in subsequent submissions. This table is not to be submitted with subsequent Progress Reports.

Table C. 1. describes the construction and data requirements for the Plan Table.

Table C.1. Example Plan Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Unique
utility_name	EC abbreviation. Acceptable values are the following: • PG&E • SDG&E • SCE	NVARCHAR(32)	Limited Options
name	The name of the plan.	NVARCHAR(255)	
start_date	Start date of the plan.	DATETIME	
end_date	End date of the plan.	DATETIME	
plan_submission_date	Date the plan was submitted to Energy Safety.	DATETIME	
narrative_submission	A short form text field to describe a plan.	TEXT	
high_risk_threshold	See "High-Risk Threshold" in Section 2.7.9, Project-Level Thresholds and Standards for definition.	REAL	
ignition_tail_risk_threshold	See "Ignition Tail Risk Threshold" in Section 2.7.9, Project-Level Thresholds and Standards for definition.	REAL	
high_frequency_outage_program_threshold	See "High Frequency Outage Program Threshold" in Section 2.7.9, Project-Level Thresholds and Standards for definition.	REAL	

Additional requirements for a Plan Table are as follows:

a) The Plan Table has only a single row of data which designates static information regarding the submitted EUP. Values in this table cannot be modified. If any value needs to be modified, this requires submission of a new EUP.
b) The PLAN_ID is defined by the value in this table, and must remain consistent for all subsequent tables, including in future Progress Reports. However, the Large Electrical Corporation must assign a new PLAN_ID, if an EUP is rejected and needs to be resubmitted.

C.1.2 Key Decision-Making Metrics Table

This section establishes the requirements for a KDMM Table that the Large Electrical Corporation must submit. The Large Electrical Corporation must submit a KDMM Table in Progress Report 0, describing all KDMMs which they will use during application of the EUP.

Table describes the construction and data requirements for the KDMM Table.

Table C.2. Example KDMM Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
kdmm_name	The name of the KDMM (e.g., Overall Utility Risk, Ignition Consequence, etc.) Name must match those from the KDMM table in Section 2.7.3 of these Guidelines.	NVARCHAR(255)	Limited values
kdmm_number	For the seven required (and up to 5 optional) KDMMs, which number (1,2,3, etc.).	INT	
kdmm_is_cumulative	Indicate whether the KDMM is "Cumulative" or “Non-Cumulative".	BOOLEAN	
kdmm_definition	An explanation of what this KDMM represents.	TEXT	

Additional requirements for a KDMM Table are as follows:

a) The Large Electrical Corporation must use KDMM_NAME to map submissions of this table to the JSON data submissions.
b) This table is only to be submitted once, at the initial submission of the Plan. This table is not to be resubmitted or edited with future Progress Reports.
c) This table must include the same KDMMs as the EUP narrative and table submission.
d) The KDMM_NUMBER is defined by this table, and the project_variable_modifiers and risk_landscape JSON files must use the same KDMM_NUMBERS.

C.1.3 Risk Model Version History Table

This section establishes the requirements for a Risk Model Version History Table accompanying the submission of the PROJECT_VARIABLE_MODIFIERS JSON file with the initial submission of the EUP and all subsequent Progress Reports. Each row of this table is a unique calibration of the Large Electrical Corporation's Risk Modeling Methodology. This table must reflect the most current information as of each Progress Report submission.

Table C.3. describes the construction and data requirements for the Risk Model Version History Table.

Table C.3. Example Risk Model Version History Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
risk_model_version_id	A unique value identifying the risk model versioning.	NVARCHAR(255)	Must match JSON submission
version_date	Date this version was established.	DATETIME	
risk_model_calibration_id	A unique value identifying the calibration number for this risk model version.	NVARCHAR(255)	Must match JSON submission
calibration_date	Date this calibration was established.	DATETIME	
change_description	Text explaining what changes took place compared to the previous version/calibration.	TEXT	

Column Name	Field Description	Data Type	Data Type Requirements
	If only a calibration update, describe which modules were recalibrated and the topline effects. If a full version update, describe any new models or interactions, and topline outcome effects.		

Additional requirements for a Risk Model Version History Table are as follows:

a) This table is a historical record table, with rows to be added as new versions are created and calibrated. At least one row must be submitted alongside Progress Report 0, and this table is to be resubmitted with each Progress Report only if new rows are added. The final row of this table is presumed to record the Large Electrical Corporation's most up to date Risk Modeling Methodology.
b) A model's CALIBRATION_DATE is the date the model's calibration was finalized internally at the Large Electrical Corporation, not the date of submission of this model in a subsequent Progress Report.
c) If multiple updates to the Risk Modeling Methodology are made at different times between Progress Reports, then the Large Electrical Corporation will add multiple new rows to the table.
d) Each new row of this table in each Progress Report will be accompanied by a submission of a PROJECT_VARIABLE_MODIFIERS JSON data file, even if this would require multiple new JSON file submissions. The RISK_MODEL_VERSION_ID and RISK_MODEL_CALIBRATION_ID must match those submitted in those files.

C.1.4 Portfolio Table

This section establishes the requirements for a Portfolio Table in Progress Report 0 and in every subsequent Progress Report. This table includes information on the current and previous portfolios and Risk Modeling Methodologies being used by the Large Electrical Corporation.

Table .4. describes the construction and data requirements for the Portfolio Table.

Table C.4. Example Portfolio Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
portfolio_id	A unique value identifying the portfolio.	NVARCHAR(255)	Unique
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
project_list	A comma delimited list of all Confirmed Projects in the portfolio, by their project_id.	TEXT	Must match the Project Table
description	A narrative overview of the current Portfolio, including a description of the changes since the last Progress Report.	TEXT	
total_circuit_segments_in_portfolio	Total number of Circuit Segments in portfolio.	INT	
start_date	Start date of the Plan.	DATETIME	
estimated_completion_date	Estimated completion date of final project in portfolio.	DATETIME	
risk_model_version_id	A unique value identifying the risk landscape.	NVARCHAR(255)	Must match version in project_variable_modifiers.json file
risk_model_calibration_id	A unique model identifying the calibration number of the risk landscape.	NVARCHAR(255)	Must match calibration in project_variable_modifiers.json file

Additional requirements for a Portfolio Table are as follows:

a) The Portfolio Table is a historical records table, with rows to be added as the Portfolios evolve. This will be submitted with an additional new row of data at each Progress Report.
b) The Large Electrical Corporation must assign the Portfolio a unique integer ID, which is the unique identifier for the list of Confirmed Projects being considered for undergrounding. When this list of Confirmed Projects changes, so too does the PORTFOLIO_ID. However, changes to the individual details of a project (e.g., changing the cost estimate, undergrounded length, etc.) do not change the list of Confirmed Projects and therefore do not change the PORTFOLIO_ID.
c) In Progress Reports, the Large Electrical Corporation must update the Portfolio Table, including RISK_MODEL_VERSION_ID, RISK_MODEL_CALIBRATION_ID, and DESCRIPTION, if there are any modifications to the Risk Modeling Methodology. The version and calibration of the risk model are the current one as of the Progress Report submission, and the distinction between versioning and calibration is as described in Section 2.7.5.2 of the Guidelines.
d) START_DATE refers to the inception date of the Plan, not the start date of individual projects.
e) The Large Electrical Corporation must submit a JSON file for the Portfolio with the risk model and again in any Progress Report with a risk model update. See JSON instructions (Section C.2) for requirements on the risk model JSON file.

C.1.5 Risk Model Backtesting Table

This section establishes the requirements for a Risk Model Backtesting Table. This table is submitted once with the initial submission of the EUP and in all subsequent Progress Reports. Each row of this table is a particular calibration of the Large Electrical Corporation's Risk Modeling Methodology, applied to a particular baseline and portfolio to generate all KDMMs at that baseline and portfolio.

Table C.5 describes the construction and data requirements for the for the Risk Model Backtesting Table.

Table C.5. Example Risk Model Backtesting Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	must Must match Plan Table

Column Name	Field Description	Data Type	Data Type Requirements
risk_model_version_id	A unique value identifying the risk model versioning.	NVARCHAR(255)	Must match Risk Model Version History Table
risk_model_calibration_id	A unique value identifying the calibration number for this risk model version.	NVARCHAR(255)	Must match Risk Model Version History Table
calibration_date	Date this calibration was established.	DATETIME	Must match Risk Model Version History Table
baseline_date	The date representing the baseline used for modeling in this row.	DATETIME	Must match date of initial submission or subsequent Progress Report
portfolio_id	The portfolio used for modeling in this row.	NVARCHAR(255)	Must match the portfolio_id of the Portfolio which was current as of the baseline_date.
Then, for each KDMM, the following columns:			
kdmm_#_name	The name of the KDMM.	NVARCHAR(255)	Must match KDMM Table
kdmm_#_value_baseline	The value of this KDMM output from applying the specified risk model to the specified baseline.	REAL	
kdmm_#_uncertainty_baseline	Uncertainty of this KDMM under these modeling conditions.	NVARCHAR(255)	Write numerical effects as string, e.g. • “± 0.4” • “+0.2, -0.1”, • “± 10%”

Column Name	Field Description	Data Type	Data Type Requirements
kdmm_#_value_portfolio	The value of this KDMM output from applying the specified risk model to the specified portfolio.	REAL	
kdmm_#_uncertainty_portfolio	Uncertainty of this KDMM under these modeling conditions.	NVARCHAR(255)	Write numerical effects as string, e.g. • "± 0.4" • "+0.2, -0.1", • "± 10%"

Additional requirements for a Risk Model Backtesting Table are as follows:

a. This table is a historical record table, with rows to be added as new versions are created and calibrated. At least one row must be submitted alongside Progress Report 0, applying the initial risk model to the initial baseline and Portfolio.
b. With each Progress Report, a new row is added which applies the *current* risk model to the *current* baseline and Portfolio.
c. Additionally, with each update to the Risk Modeling Methodology (e.g. addition of a new row to the Risk Model Version History Table via either a new model or a new calibration), a row will be added applying the *current* risk model to *all prior* baselines and Portfolios, one row per baseline/portfolio and model.
d. Additionally, with each Progress Report, a new row will be added applying each *prior* risk model to the *current* baseline/portfolio, one row per model.
e. For each KDMM, three additional columns are added. The "#" character in the column names is to be replaced by an integer, e.g. ("kdmm_1_name", "kdmm_2_name", etc.).
f. The KDMMs must be listed in the same order as they appear as rows of the KDMM Table.

C.1.6 Circuit Segment Identification Table

This section establishes the requirements for a Circuit Segment Identification Table, first submitted in Progress Report 0 and submitted again in every subsequent Progress Report. This table must reflect the most current modeling information (see Section 2.4.2.1) as of each Progress Report submission. As required in Section 2.4.2.1, must be the same list and scores used at that time by the Large Electrical Corporation for risk modeling and decision-making.

Table C.6 describes the construction and data requirements for the Circuit Segment Identification Table.

Table C.6. Example Circuit Segment Identification Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
circuit_segment_id	A unique value identifying the Circuit Segment ID.	NVARCHAR(255)	See introduction to Appendix C
circuit_id	A unique value identifying the circuit.	NVARCHAR(255)	Must match circuit_ids as provided in WMP data submission
qdr_circuit_segment_id	If this Circuit Segment was included in the most recent Quarterly Data Report submission as part of the WMP process, list the name used in that report	NVARCHAR(255)	Must match an entry in the WMP data submission
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Must match project_id from Project Table if this circuit has passed through Screen 2 and has been assigned a project_id, otherwise leave blank
is_non_eup_project	Whether this Circuit Segment is not part of the EUP, but is already planned for mitigations through mechanisms besides the EUP.	BOOLEAN	Leave blank if is_in_area is False
external_funding	If mitigation of this Circuit Segment is already funded through the General Rate Case or other funding, describe that program here.	TEXT	See below for instructions depending on whether this is an Undergrounding Project, a Non-EUP Project, or neither
planned_mitigation_explanations	If mitigation of this Circuit Segment is currently planned through mechanisms besides the EUP, describe the mitigation type here.	TEXT	Leave blank if is_non_eup_project is False or blank
wmp_utility_initiative_tracking_id	If mitigation of this Circuit Segment is going to take place as part of the Wildfire Mitigation Plan (WMP), list	NVARCHAR(255)	Leave blank if not applicable

Column Name	Field Description	Data Type	Data Type Requirements
	the utility_initiative_tracking_id as defined in the WMP.		
circuit_segment_length	The length of the Circuit Segment, in miles.	REAL	
hftd_tier	Which High Fire-Threat District tier the Circuit Segment falls into. Options: • Tier 3 • Tier 2 • Non-HFTD	NVARCHAR(255)	Limited options
rebuild_area	Whether this Circuit Segment falls within a Wildfire Rebuild Area.	BOOLEAN	
is_in_area	Whether this Circuit Segment falls into the In-Area Circuit Segments List (i.e. either hftd_tier = Tier 3 or Tier 2, or rebuild_area = True).	BOOLEAN	
is_eligible_circuit_segment	Whether this Circuit Segment has passed Screen 1 and is on the Eligible Circuit Segments List.	BOOLEAN	
county	Name of the county that the Circuit Segment falls primarily into**.**	NVARCHAR(255)	Must be a county name in California

Additional requirements for a Circuit Segment Identification Table are as follows:

a) In the initial submission, the Large Electrical Corporation must provide each Circuit Segment within its territory as a separate row. This must be a comprehensive list including all Circuit Segments in the utility territory, even ones which do not qualify for undergrounding under the proposed EUP.
b) When this table is submitted in subsequent Progress Reports, the Circuit Segments must remain the same, unless they have been newly created, merged, or split, as described above.
c) Each Undergrounding Project is associated with only a single Circuit Segment. For example, any proposed undergrounding which takes place on e.g., two adjacent Circuit Segments must be considered as two individual Undergrounding Projects.

Conversely, all proposed undergrounding work on a single Circuit Segment will be considered one Undergrounding Project and share the same PROJECT_ID.
If a Circuit Segment is substantially modified, e.g. by splitting into two Circuit Segments, the change must appear in the Circuit Segment Changelog Table (Appendix C.1.7). The new Circuit Segments must use unique names that have never been submitted before through the Circuit Segment Identification Table.

d) The "EXTERNAL_FUNDING" variable is tracked as follows, depending on whether the Circuit Segment is an Undergrounding Project within the EUP, a Non-EUP Project, or neither. If this Circuit Segment is an Undergrounding Project within the EUP, list the external sources of all funding for Non-Undergrounding Subprojects on this Circuit Segment. If this Circuit Segment is a Non-EUP Project, list the external sources of all funding for mitigation of this Circuit Segment, including for undergrounding or other system hardening. If this Circuit Segment is not being considered for mitigations or IS_NON_EUP_PROJECT is blank, leave this field blank.

The Large Electrical Corporation must submit associated spatial data with each Progress Report (Section C.4 below). The CIRCUIT_ID and CIRCUIT_SEGMENT_ID in the Circuit Segment Identification Table must map to the associated IDs in that submission. Additionally, the QDR_CIRCUIT_SEGMENT_ID must map to a Circuit Segment in the spatial data provided in the most recent Wildfire Mitigation Plan Quarterly Data Report.

C.1.7 Circuit Segment Changelog Table

This section establishes the requirements for a Circuit Segment Changelog Table. This table is not submitted with the initial submission of the EUP (Progress Report 0), however it must be submitted with all subsequent Progress Reports. Each row of this table is a change which results in a new Circuit Segment with a new CIRCUIT_SEGMENT_ID.

Table C.7 describes the construction and data requirements for the for the Circuit Segment Changelog Table.

Table C.6. Example Circuit Segment Changelog Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan table
circuit_segment_id	A unique value identifying the new Circuit Segment ID.	NVARCHAR(255)	Unique Circuit Segment ID

Column Name	Field Description	Data Type	Data Type Requirements
circuit_id	A unique value identifying the Circuit.	NVARCHAR(255)	Unique, must match circuit_id provided in most recent QDR spatial submission files
change_type	Identification of how this Circuit Segment has been defined or redefined since the last Progress Report. Possible options: • New Construction • Rename • Split • Merge • Other, see comment	NVARCHAR(255)	Limited Values
change_date	Date this Circuit Segment change was reported (i.e. date of submission of this Progress Report).	DATETIME	
source_circuit_segment_ids	Comma delimited list of all Circuit Segments submitted in the prior Progress Report, which contributed to this new segment. May be a single value if only one prior Circuit Segment connects.	TEXT	Each comma-separated value must be identifiable with a Circuit Segment ID from the prior Progress Report
comment	Explanation of the change if change_type is "other, see comment."	TEXT	Leave blank if change_type is not "other, see comment"

Additional requirements for a Circuit Segment Changelog Table are as follows:

a) This table is a historical record table, with rows to be added as equipment is added or removed that redefines the boundaries of Circuit Segments. With each Progress Report, a new row is added for each new CIRCUIT_SEGMENT_ID, identifying if this new Circuit Segment is a split, rename, new construction, or has some other relationship with the Circuit Segments submitted in the previous Progress Report. When this table is submitted in subsequent Progress Reports, previous rows must continue to be included as well as any new rows to be added.

b) In all Progress Reports subsequent to Progress Report 0, the CIRCUIT_SEGMENT_ID in each row in the Circuit Segment Identification Table must correspond to either a

CIRCUIT_SEGMENT_ID in the prior Progress Report's Circuit Segment Identification Table, or to a CIRCUIT_SEGMENT_ID in this Circuit Segment Changelog Table.

c) CIRCUIT_SEGMENT_IDs cannot be reused. If a new Circuit Segment is created and it requires a new ID, this ID must not have been previously submitted at any point in the lifetime of the EUP (e.g. including the date of the Progress Report in which this ID was first submitted within the string name).
d) If a Circuit Segment's CHANGE_TYPE is "New Construction", then the Circuit Segment is created entirely from new assets, and does not overlap with any Circuit Segment present in the previous Progress Report.
e) If a Circuit Segment's CHANGE_TYPE is "Rename", then the Circuit Segment's CIRCUIT_SEGMENT_ID is new, but the assets themselves are identical to a Circuit Segment submitted in the previous Progress Report.
f) If a Circuit Segment's CHANGE_TYPE is "Split", then the Circuit Segment's CIRCUIT_SEGMENT_ID is new, but the assets themselves are a subset of a Circuit Segment submitted in the previous Progress Report, e.g. a new segmentation device was added.
g) If a Circuit Segment's CHANGE_TYPE is "Merge", then the Circuit Segment's CIRCUIT_SEGMENT_ID is new, but the assets themselves are a composed from multiple Circuit Segments submitted in the previous Progress Report, e.g. a segmentation device was removed.
h) If a Circuit Segment's CHANGE_TYPE is "Other, see comment", then the Circuit Segment's CIRCUIT_SEGMENT_ID is new, and the relationships to assets submitted in a previous Progress Report is not captured in the other options. In this case, list relevant Circuit Segments from the previous Progress Report as well as explain how this segment was created. The comment should be sufficient as to allow Energy Safety to identify what the relationship is that this Circuit Segment has to previous Circuit Segments in the same geographic area.
i) In each of the above sections, small overlaps, small changes to the Circuit Segment such as addition of equipment, upgrades, or small changes in location do not need to be considered here, only major changes that would make a Circuit Segment impossible to directly track over time.

C.1.8 Circuit Segment Risk Score Table

This section establishes the requirements for a Circuit Segment Risk Score Table. The Large Electrical Corporation must submit a Circuit Segment Risk Score Table for each Circuit Segment in the Circuit Segment Identification Table. This table must reflect the most current information as of each Progress Report submission.

Table C.8 describes the construction and data requirements for the Circuit Segment Risk Score Table.

Table C.7. Example Circuit Segment Risk Score Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
circuit_segment_id	A unique value identifying the Circuit Segment ID.	NVARCHAR(255)	Unique Circuit Segment_id
circuit_id	A unique value identifying the Circuit.	NVARCHAR(255)	Unique, must match Project Table circuit_id and QDR spatial submission circuit_id
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Must match project_id from Project Table if this circuit passes Screen 2, otherwise leave blank
risk_model_version_id	A unique value identifying the current version of the Risk Model.	NVARCHAR(255)	Must match last row of Risk Model Version History Table
risk_model_calibration_id	A unique value identifying the current calibration of the Risk Model.	NVARCHAR(255)	Must match last row of Risk Model Version History Table
risk_category	Identifying if this Circuit Segment, based on its risk score, would fall into one of the mitigation eligibility categories and if so, how. Possible values are the following: • High Risk • Ignition Tail Risk • High Frequency Outage Program • None	NVARCHAR(255)	String of one of the available options. If a Circuit Segment qualifies under multiple categories, list all categories separated by commas
overall_utility_risk	Utility risk score.	REAL	
ignition_risk	Ignition risk score	REAL	

Column Name	Field Description	Data Type	Data Type Requirements
ignition_consequence	Ignition consequence score.	REAL	
ignition_likelihood	Ignition likelihood	REAL	
outage_program_risk	Outage Program risk score	REAL	
outage_program_consequence	Outage Program consequence score.	REAL	
outage_program_likelihood	Outage Program likelihood.	REAL	
overall_utility_risk_rank_system	Rank of the risk within the system.	INT	
overall_utility_risk_rank_portfolio	Rank of the risk within the portfolio.	INT	Leave blank if not included in the portfolio
ignition_consequence_rank_system	Rank of Ignition Consequence within the system.	INT	
ignition_consequence_rank_portfolio	Rank of Ignition Consequence within the portfolio.	INT	Leave blank if not included in the portfolio
outage_program_likelihood_rank_system	Rank of Outage Program Likelihood within the system.	INT	
outage_program_likelihood_rank_portfolio	Rank of Outage Program Likelihood within the portfolio.	INT	Leave blank if not included in the portfolio

Additional requirements for a Circuit Segment Risk Score Table are as follows:

a) In the initial submission, the Large Electrical Corporation must provide each Circuit Segment within its territory as a separate row. This must be a comprehensive list including all Circuit Segments in the utility territory, even ones which do not qualify for undergrounding under the proposed EUP.
b) The Circuit Segments here must match those submitted in the Circuit Segment Identification Table.

c) The RISK_CATEGORY variable tracks whether the Circuit Segment's risk scores exceed the Project-level thresholds for each of the three categories, regardless of its inclusion in High Fire Threat District or Wildfire Rebuild areas. Therefore, there may be Circuit Segments with a RISK_CATEGORY not equal to "None", but which are still not eligible for consideration in the EUP.
d) With each Progress Report, the values in this table will update if the risk model changes. Use the current risk model outputs at the Circuit Segment level. This does not require Confirmed Projects to pass through screens again, even if the new risk model scores would not pass through the existing screens.

C.1.9 Screen History Table

This section establishes the requirements for a Screen History Table. The Large Electrical Corporation must submit a Screen History Table in Progress Report 0 and in every subsequent Progress Report. This table must reflect the most current information as of each Progress Report submission. Multiple screens may be applied between Progress Reports. The Large Electrical Corporation must submit each applied screen as a new row.

Table C.9 describes the construction and data requirements for the Screen History Table.

Table C.8. Example Screen History Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
circuit_segment_id	A unique value identifying the Circuit Segment ID.	NVARCHAR(255)	Unique Circuit Segment ID
circuit_id	A unique value identifying the Circuit.	NVARCHAR(255)	Unique, must match circuit_id provided QDR spatial submission files
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Must match Project Table, may be blank if not being used
portfolio_id	A unique value identifying the portfolio.	NVARCHAR(255)	Must match Portfolio Table, may be blank if not being used

Column Name	Field Description	Data Type	Data Type Requirements
is_active	This Undergrounding Project is currently being considered for the next screen, or if confirmed and prioritized, is being developed for construction.	BOOLEAN	
screen_number	A unique value identifying the screen. Enter value between 1 and 4. Every time a screen is applied to the Circuit Segment, update this field and the remaining fields in this table.	INT	
screen_name	Provide the name of the screen. • Screen 1: Circuit Segment Eligibility • Screen 2: Project Information and Alternative Mitigation Comparison • Screen 3: Project Risk Analysis • Screen 4: Project Prioritization	NVARCHAR(255)	
passed_date	Date at which this screen was applied.	DATETIME	

Additional requirements for a Screen History Table are as follows:

a) In the initial submission, the Large Electrical Corporation must provide a row for each screen applied to each Circuit Segment, e.g., if a particular Circuit Segment has already passed Screen 3, it must have a row for when that segment was passed through each of Screen 1, Screen 2, and Screen 3, with the dates those screens were applied (which may be before submission of the EUP). Consequently, Circuit Segments which have not passed Screen 1 will not be included in this table.
b) This table is recorded at the project level, meaning that the Circuit Segment ID used should match the original Circuit Segment the Undergrounding Project was created on, even if that Circuit Segment no longer appears in the Circuit Segment Identification Table.

c) In each subsequent Progress Report, additional rows will be added to the table to reflect additional screens that individual Circuit Segments have passed through. Prior rows should not be modified, however the order of rows (append all new updates to end, grouping all updates for a particular project together, etc.) will be left up to the Large Electrical Corporation.
d) If an Undergrounding Project is abandoned on a Circuit Segment, that progress must be reflected as new rows on this table with a new PROJECT_ID, without overwriting or removing the progress of the earlier Undergrounding Project.

C.1.10 Project Table

This section establishes the requirements for a Project Table. The Large Electrical Corporation must submit a Project Table which contains information on each Undergrounding Project as an individual row. Undergrounding Projects must be included in this table once they have passed through Screen 2 (Project Information and Alternative Mitigation Comparison). This table must reflect the most current information as of each Progress Report submission, so any changes to the information in this table for a particular Undergrounding Project will be reflected in future submissions. The Large Electrical Corporation will update and submit the full Project Table with each Progress Report, even if no update was made to an individual Undergrounding Project.

Table C.10 describes the construction and data requirements for the Project Table.

Table C.10. Example Project Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Unique
circuit_segment_id	A unique value identifying the Circuit Segment which was used to define this Undergrounding Project.	NVARCHAR(255)	Unique Circuit Segment ID
circuit_id	A unique value identifying the Circuit.	NVARCHAR(255)	Unique, must match circuit_id provided in QDR spatial submission files

Column Name	Field Description	Data Type	Data Type Requirements
circuit_segment_vintage	The Progress Report in which this Undergrounding Project was defined	INT	Must be a previous Progress Report number 0, 1, 2, etc.
portfolio_ids	A list of all Portfolios this Undergrounding Project was included in.	STRING	Comma delimited list of strings
is_confirmed_project	True if this Undergrounding Project has passed Screen 3. Else False.	BOOLEAN	
cpuc_project_code	A code that identifies a grouping of Undergrounding Projects associated with a certain activity. Examples include the following: • O8W - System Hardening Wildfire Resiliency Projects • 3UG - Targeted Undergrounding • 95F - Electric Distribution Major Emergency	NVARCHAR(255)	Leave blank if does not apply.
risk_category	The category of the Undergrounding Project. Acceptable values are: • High-Risk Project • Ignition Tail Risk Project • High Frequency Outage Program Project	NVARCHAR(255)	Limited values

Column Name	Field Description	Data Type	Data Type Requirements
	• Wildfire Rebuild		
division	Division of the service territory in which the Undergrounding Project will take place.	NVARCHAR(255)	
county	County of location of this Undergrounding Project.	NVARCHAR(255)	Separate with commas if multiple
hftd_tier	A string representing the CPUC High Fire-Threat District (HFTD) area. Below are the integer values with the associated meaning. Acceptable values are the following: • HFTD Tier 2 • HFTD Tier 3 • Non-HFTD	NVARCHAR(32)	Limited values
rebuild_area	A categorical value signifying whether an Undergrounding Project is in a Wildfire Rebuild Area or not. Below are the possible values: • Not in Wildfire Rebuild Area • In a Wildfire Rebuild Area	BOOLEAN	
customer_count	Number of customers served by this Circuit Segment, as defined by CPUC Data Appendix 1.	INT	

Column Name	Field Description	Data Type	Data Type Requirements
feasibility_score	Cost multiplier indicating the difficulty of undergrounding based on presence of hard rock, water crossing, and gradient. The scale ranges from 1 to 3, with 3 being most challenging.	INT	Limited values
risk_model_version_id	A unique value identifying the risk model version under which this Undergrounding Project was selected.	NVARCHAR(255)	Must match an entry in the Risk Model Version History Table
risk_model_calibration_id	A unique value identifying the risk model calibration under which this Undergrounding Project was selected.	NVARCHAR(255)	Must match an entry in the Risk Model Version History Table
selection_justification	For every Undergrounding Project, a justification using the KDMMs of why it was selected.	TEXT	
project_priority	Prioritization level of the Undergrounding Project, according to the prioritization scheme defined in the EUP.	TEXT	Blank if the Undergrounding Project has not passed Screen 4
wmp_overlap_current	Is this Circuit Segment included in a current WMP initiative?	BOOLEAN	
wmp_overlap_historical	Is this Circuit Segment included in a WMP historical initiative?	BOOLEAN	

Column Name	Field Description	Data Type	Data Type Requirements
wmp_utility_initiative_tracking_id	Provide any associated utility initiative tracking ID.	NVARCHAR(255)	Leave blank if wmp_overlap_current and wmp_overlap_historical are False
risk_tranche	CPUC defined "risk tranche". Tranches include a group of assets, a geographic region, or other grouping that is intended to have a similar risk profile, such as having the same likelihood or consequence of risk events.	NVARCHAR(255)	
list_of_subprojects	The list of all Subprojects associated with this Undergrounding Project.	TEXT	Comma-delimited list. Leave blank if Subprojects have not yet been scoped.
project_complete	Is this Undergrounding Project finished?	BOOLEAN	
project_defunct	Is this Undergrounding Project not complete, but no longer intended for construction?	BOOLEAN	

Additional requirements for a Project Table are as follows:

a) PROJECT_IDs are defined by this table and must remain consistent over time and not be altered during updates. An Undergrounding Project must be added to this table when it has passed through Screen 2. An Undergrounding Project is identified with a Circuit Segment when it is added to this table. If the Circuit Segment changes after this point, the Undergrounding Project remains identified with the original Circuit Segment, even if it no longer appears in the Circuit Segment Identification Table.
b) Undergrounding Projects cannot be defined as overlapping. If an Undergrounding Project is defined on a Circuit Segment which already has some overlap with existing Undergrounding Projects, the overlapping sections must be removed in all analysis.

c) In each Progress Report, any newly proposed Undergrounding Projects must be included with new PROJECT_IDs. All previously included Undergrounding Projects must still be included, however the order of rows (append, move defunct projects to end, grouping by prioritization, etc.) will be left up to the Large Electrical Corporation.
d) Each Undergrounding Project's PORTFOLIO_IDS table will include the PORTFOLIO_ID of all Portfolios whose Project List includes this project. For example, if an Undergrounding Project is included in Portfolio 0, then PORTFOLIO_IDS will be "0". If that same project is included again in Portfolio 1, then PORTFOLIO_IDS will be "0,1". If an Undergrounding Project has passed Screen 2 but has not yet passed Screen 3, then it will not yet be included in any Portfolio. In this case, this field is to be left blank. If, on the other hand an Undergrounding Project is removed from the Portfolio because it is finished, it is abandoned, or it is dropped from the list for some other reason, it will still be submitted in this table with information on the portfolios it was included in.
e) The RISK_MODEL_VERSION_ID and RISK_MODEL_CALIBRATION_ID refer to the version and calibration under current use when this Undergrounding Project was originally selected for undergrounding and passed Screen 2. If the version or calibration changes in future Progress Reports, this field is not to be updated for existing Undergrounding Projects.

C.1.11 Screen 2 Table

This section establishes the requirements for a Screen 2 Table that the Large Electrical Corporation must submit for each Undergrounding Project which has passed Screen 2. The Large Electrical Corporation must submit a Screen 2 Table at the initial EUP submission and with each Progress Report. This table must reflect the most current information as of each Progress Report submission.

Table C.11 describes the construction and data requirements for the Screen 2 Table.

Table C.9. Example Screen 2 Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Must match Project Table
comparison_name	The name of the comparison considered. Options include:	NVARCHAR(255)	Limited values, though additional

Column Name	Field Description	Data Type	Data Type Requirements
	• 100% Underground • Alternative Mitigation 1 • Alternative Mitigation 2 • Additional Comparison		alternatives may also be included if described in the EUP
portfolio_id	A unique value identifying the portfolio.	NVARCHAR(255)	Must match Portfolio Table, or blank if this Undergrounding Project has not yet passed Screen 3.
circuit_segment_id	A unique value identifying the Circuit Segment ID on which this Undergrounding Project was defined.	NVARCHAR(255)	Must match Project Table
circuit_id	A unique value identifying the Circuit on which this Undergrounding Project was defined.	NVARCHAR(255)	Must match Project Table
work_type	Work to be performed on Circuit Segment or “multiple”.	NVARCHAR(255)	Limited values
work_type_description	Description of the type of mitigation. If work type is “multiple”, list all of the mitigations or combination of mitigations that will be applied throughout the Circuit Segment.	TEXT	
fraction_undergrounded	Fraction of Circuit Segment’s original unmitigated overhead that will be removed and replaced with undergrounded line.	REAL	Value between 0 and 1
reliability_benefits	Reliability Benefits of the mitigation per D.22-12-027.	REAL	Dollarized Value
financial_benefits	Financial Benefits of the mitigation per D.22-12-027.	REAL	Dollarized Value
safety_benefits	Safety Benefits of the mitigation D.22-12-027.	REAL	Dollarized Value
total_risk_reduction	Risk Reduction of the mitigation per D.22-12-027.	REAL	Dollarized Value

Column Name	Field Description	Data Type	Data Type Requirements
unit_cost_per_overhead_mile_deenergized	Project Unit Cost per Mile of Overhead Exposure. Leave blank for alternative mitigations, fill in for "100% Undergrounding".	REAL	Dollarized Value
unit_cost_per_circuit_mile_energized	Project Unit Cost per Mile of Undergrounding for Undergrounding Project or Project Unit Cost per Circuit Mile for Alternative Mitigation.	REAL	Dollarized Value
total_costs	Total mitigation cost.	REAL	Dollarized Value
cost_benefit_ratio	Cost-Benefit Ratio of the Undergrounding Project per D.22-12-027. Benefits must relate to the mitigation of overhead line miles not miles of undergrounding.	REAL	

Additional requirements for a Screen 2 Table are as follows:

a) Each row of this table is a Circuit Segment considered for inclusion in the EUP as an Undergrounding Project, or an alternative project comparison. The required alternative comparisons are explained further in Section 2.7.10.
b) The WORK_TYPE field must correspond to one of the required comparisons in Section 2.7.10 and match one of the alternatives described in Chapter 3 of the EUP narrative for project acceptance framework of the approved EUP. List "multiple" if multiple mitigations are being considered on different parts of the Circuit Segment.
c) All Undergrounding Projects in the Project Table must appear here.
d) This table must be updated, and the values recalculated, if the CPUC definitions of any of the above terms are changed or updates to the Risk Model Version change their values.

C.1.12 Screen 3 Table

This section establishes the requirements for a Screen 3 Table that the Large Electrical Corporation must submit for each Undergrounding Project which has passed Screen 3. The Large Electrical Corporation must submit a Screen 3 Table at the initial submission and with each Progress Report. This table must reflect the most current information as of each Progress Report submission.

Table C.12 describes the construction and data requirements for the Screen 3 Table.

Table C.12. Example Screen 3 Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Must match Project Table
comparison_name	The name of the comparison considered. Options include: • Project as scoped • Screen 3 Alternative Mitigation • Undergrounding as scoped • Project Baseline • Additional Comparison	NVARCHAR(255)	Limited values, though additional alternatives may also be included if described in the EUP.
alternative_mitigation_justification	A narrative detailing how and why the alternative mitigation was chosen.	TEXT	Leave blank if comparison_name is “Project as scoped”, “Undergrounding as scoped”, or “Project Baseline”
portfolio_id	A unique value identifying the portfolio.	NVARCHAR(255)	Must match current Portfolio Table
circuit_segment_id	A unique value identifying the Circuit Segment ID on which the Undergrounding Project was defined.	NVARCHAR(255)	Must match Project Table
circuit_id	A unique value identifying the Circuit on which the Undergrounding Project was defined.	NVARCHAR(255)	Must match Project Table
work_type	Work to be performed on Circuit Segment or “multiple”.	NVARCHAR(255)	Limited values
work_type_description	Description of the type of mitigation. If work type is “multiple”, list all of the mitigations or combination of mitigations that will be applied throughout the Circuit Segment.	TEXT	

Column Name	Field Description	Data Type	Data Type Requirements
fraction_undergrounded	Fraction of Circuit Segment's original unmitigated overhead that will be removed and replaced with undergrounded line.	REAL	Value between 0 and 1
fulfills_project_level_standard	Does the proposed mitigation fulfill the Project-Level Standard?	BOOLEAN	
additional_justification	Additional narrative required to justify this Undergrounding Project's inclusion if it does not fulfill the Project-Level Standard.	TEXT	Left blank if "fulfills_project_level_standard" is True or comparison_name is not "Project as Scoped"
cumulative_overall_utility_risk_in_year_55	The cumulative Overall Utility Risk experienced at this location, accounting for the proposed construction timeline for undergrounding and a realistic timeline for alternative mitigations.	REAL	
cumulative_wildfire_risk_in_year_55	The cumulative Ignition Risk experienced at this location, accounting for the proposed construction timeline for undergrounding and a realistic timeline for alternative mitigations.	REAL	
cumulative_outage_program_risk_in_year_55	The cumulative Outage Program Risk experienced at this location, accounting for the proposed construction timeline for undergrounding and a realistic timeline for alternative mitigations.	REAL	
mean_ignition_consequence_in_first_10_years_of_program	The mean Ignition Consequence score at this location, evaluated over the first 10 years of the program, accounting for the proposed construction timeline for undergrounding and a realistic timeline for alternative mitigations.	REAL	
mean_outage_program_likelihood_in_first_10_years_of_program	The mean Outage Program Likelihood at this location, evaluated over the first 10 years of the program, accounting for the proposed construction timeline for	REAL	

Column Name	Field Description	Data Type	Data Type Requirements
	undergrounding and a realistic timeline for alternative mitigations.		

Additional requirements for a Screen 3 Table are as follows:

a) Each row of this table is a considered Undergrounding Project, or an alternative project comparison. The required alternative comparisons are explained further in Section 2.7.10.
b) The WORK_TYPE field must correspond to one of the required comparisons in Section 2.7.10 and match one of the alternatives described in the Chapter 3 narrative for project acceptance framework of the approved EUP. List "multiple" if multiple mitigations are being considered on different parts of the Circuit Segment.
c) The ALTERNATIVE_MITIGATION_JUSTIFICATION field must provide a narrative detailing how the alternative mitigation was chosen, and why it is the best alternative to the Project as Scoped. As supporting evidence, this narrative can use data from Screen 2, and other project specific scoping details determined in Screen 3.
d) Undergrounding Projects are considered to have passed Screen 3 when all the information in this table has been calculated. Therefore, there may be Undergrounding Projects which do not appear in this table but which appeared in the Project Table.
e) This table must be updated and the values recalculated if updates to the Risk Model Version change their values.
f) If Subprojects are modified after an Undergrounding Project passes Screen 3, the Screen 3 "Scoped Project" values must be modified to reflect the current status, until the project is completed and it is updated to reflect as-built status.
g) This table must agree with the PROJECT_RISK_LANDSCAPES JSON file submission, which includes this information among other KDMMs. Each row in this table must be accompanied by an entry in the JSON file and vice versa.

C.1.13 Screen 4 Table

This section establishes the requirements for a Screen 4 Table that the Large Electrical Corporation must submit for each Undergrounding Project which has passed Screen 4. The Large Electrical Corporation must submit a Screen 4 Table at the initial EUP submission and with each Progress Report. This table must reflect the most current information as of each Progress Report submission.

Table C.13 describes the construction and data requirements for the Screen 4 Table.

Table C.13. Example Screen 4 Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Must match Project Table
comparison_name	The name of the comparison considered. Options include: • Project as scoped • Undergrounding as scoped • Screen 3 Alternative Mitigations	NVARCHAR(255)	Limited values
project_priority	Prioritization level of the Undergrounding Project, according to the prioritization scheme defined in the EUP.	TEXT	Must match Project Table. Leave blank if "comparison_name" is not equal to "Project as Scoped"
portfolio_id	A unique value identifying the portfolio.	NVARCHAR(255)	Must match Portfolio Table
circuit_segment_id	A unique value identifying the Circuit Segment ID on which this Undergrounding Project was defined.	NVARCHAR(255)	Must match Project Table
circuit_id	A unique value identifying the Circuit on which this Undergrounding Project was defined.	NVARCHAR(255)	Must match Project Table
work_type	Work to be performed on Circuit Segment or "multiple".	NVARCHAR(255)	Limited values
work_type_description	Description of the type of mitigation. If work type is "multiple", list all of the mitigations or combination of mitigations that will be applied throughout the Circuit Segment.	TEXT	
fraction_undergrounded	Fraction of Circuit Segment's original unmitigated overhead that will be removed and replaced with undergrounded line.	REAL	Value between 0 and 1

Column Name	Field Description	Data Type	Data Type Requirements
reliability_benefits	Reliability Benefits of the mitigation per D.22-12-027.	REAL	Dollarized Value
financial_benefits	Financial Benefits of the mitigation per D.22-12-027.	REAL	Dollarized Value
safety_benefits	Safety Benefits of the mitigation D.22-12-027.	REAL	Dollarized Value
total_risk_reduction	Risk Reduction of the mitigation per D.22-12-027.	REAL	Dollarized Value
unit_cost_per_overhead_mile_deenergized	Project Unit Cost per Mile of Overhead Exposure. Leave blank for non-Undergrounding Projects.	REAL	Dollarized Value
unit_cost_per_circuit_mile_energized	Project Unit Cost per Mile of Undergrounding for Undergrounding Project or Project Unit Cost per Circuit Mile for Alternative Mitigation.	REAL	Dollarized Value
total_costs	Total mitigation cost.	REAL	Dollarized Value
cost_benefit_ratio	Cost-Benefit Ratio of the Undergrounding Project per D.22-12-027. Benefits must relate to the mitigation of overhead line miles not miles of undergrounding.	REAL	

Additional requirements for a Screen 4 Table are as follows:

a) Each row of this table is a Confirmed Project, repeated three times – once for the full project as scoped, once for just the scoped undergrounding, and once to track the finalized alternative mitigation created for Screen 3.
b) The WORK_TYPE field must correspond to one of the required comparisons in Section 2.7.10 and match one of the alternatives described in Chapter 3 of the EUP narrative for project acceptance framework of the approved EUP. List “multiple” if multiple mitigations are being considered on different parts of the Circuit Segment.

This table must be updated, and the values recalculated, if the CPUC definitions of any of the above terms are changed or updates to the Risk Model Version change their values, or if the scoped project changes such that it receives new alignment IDs.

C.1.14 Subproject Table

This section establishes the requirements for a Subproject Table.

This table is submitted at the initial EUP submission and with each Progress Report. Each row of this table is a Subproject, and this table includes all Subprojects, for each Undergrounding Project which has passed Screen 4.

Table C.14 describes the construction and data requirements for the Subproject Table.

Table C.14. Example Subproject Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
subproject_id	A unique value identifying the Subproject.	NVARCHAR(255)	New Subproject ID. Must retain the same Subproject ID over time. New Subprojects must receive new Subproject IDs which have not been used for any previously submitted Subproject.
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Must match Project Table
mitigation_type	The type of mitigation applied to this Subproject (e.g. undergrounding, covered conductor, etc.).	NVARCHAR(255)	Must match one of the mitigation types described in the project_variable_modifiers JSON.
subproject_justification	A narrative describing why this Subproject was chosen.	TEXT	
circuit_segment_id	A unique value identifying the Circuit Segment ID on which the Undergrounding Project was defined.	NVARCHAR(255)	Unique Circuit Segment ID

Column Name	Field Description	Data Type	Data Type Requirements
circuit_id	A unique value identifying the Circuit on which the Undergrounding Project was defined.	NVARCHAR(255)	Unique, must match circuit_id provided QDR spatial submission files
wmp_subproject	Is there a wildfire mitigation plan initiative associated with this Subproject?	BOOLEAN	
wmp_utility_initiative_tracking_id	Utility initiative tracking ID (if applicable).	NVARCHAR(255)	Unique, leave blank if wmp_subproject is False
wmp_cycle	If the Subproject is associated with a past, current, or future WMP submission, please provide the applicable WMP date ranges. Possible values include the following: • 2019 • 2020-2022 • 2023-2025 • 2026-2028 • 2029-2031 • 2031-2033	NVARCHAR(255)	Limited values, leave blank if wmp_subproject is False
order number	NVARCHAR(255)	Must match CPUC Guidelines for SB 844 Program Appendix 1	CPUC order number.
project_risk_reduction_fraction	The fraction of this Undergrounding Project's Overall Utility Risk Score that will be removed by completion of this Subproject.	REAL	Real number between 0 and 1
circuit_risk_reduction_fraction	The fraction of the Circuit's Overall Utility Risk Score that will be removed by completion of this Subproject	REAL	Real number between 0 and 1

Column Name	Field Description	Data Type	Data Type Requirements
expected_completion_date	The date this Subproject is estimated to be completed, with both the new alignment energized and the old alignment de-energized.	DATETIME	
is_active	This Subproject is currently being considered or worked on for the next status phase.	BOOLEAN	
is_abandoned	Is the Subproject abandoned?	BOOLEAN	
pre_mitigation_alignment_id	Map to geo-spatial submission.	NVARCHAR(255)	
post_mitigation_alignment_id	Map to geo-spatial submission.	NVARCHAR(255)	
pre_mitigation_length	Length of pre-mitigation overhead line in miles.	REAL	
post_mitigation_length	Length of post-mitigation (overhead or underground) line in miles.	REAL	
new_right_of_way	Whether the Large Electrical Corporation requires a new right-of-way or easement to perform this Subproject.	BOOLEAN	
new_right_of_way_timeline	Expected date to acquire this right-of-way for this Subproject.	DATETIME	Leave blank if new_right_of_way is False
status_current	Current Subproject status. Possible options are given by the “Project Planning and Construction Phases” as defined in Appendix A. Acceptable values are the following: • Scoping • Designing • Permitting	NVARCHAR(255)	Limited values

Column Name	Field Description	Data Type	Data Type Requirements
	• Ready for Construction • Construction In Progress • Construction Completed • Overhead De-energized		
status_change_date	The date the Subproject was moved to its current status.	DATETIME	

Additional requirements for a Subproject Table are as follows:

a) With this data submission, there is an associated spatial data submission. The SUBPROJECT_IDs for the C.4.3 - C.4.6 GIS data submissions must match the values presented here. The alignment IDs also must match the current spatial data, though this alignment may be modified between Progress Reports.
b) The Large Electrical Corporation must give the Subproject a unique ID under the SUBPROJECT_ID field. This ID must remain consistent with all future submissions.
c) This table lists all proposed Subprojects, including active, abandoned, and completed Subprojects.
d) The "PROJECT_RISK_REDUCTION" field must show the reduction of risk from this Subproject within the Confirmed Project, meaning any segments outside of the Confirmed Project Polygon are not counted.
e) The Large Electrical Corporation must provide a brief narrative that explains why each Subproject was chosen in the SUBPROJECT_JUSTIFICATION field. The narrative must include, as applicable, Subproject specific details on why any alternative mitigation was chosen over undergrounding, an explanation for any construction timeline variance from the rest of the Undergrounding Project, and a description of any other unique constraints that defined the Subproject. In particular, if any part of the Subproject does not fall within the Confirmed Project Polygon, an explanation is required to justify this Subproject's addition to this project.

C.1.15 Project Index Table

This section establishes the requirements for a Project Index Table that the Large Electrical Corporation must submit for each Undergrounding Project which has passed Screen 2 and update as the Undergrounding Projects pass through Screens 3 and 4. This table includes information found in the Screen 2, Screen 3, and Screen 4 Tables and reported data must be

compatible with the information submitted elsewhere in the data submission. This table must reflect the most current information as of each Progress Report submission.

Table C.15 describes the construction and data requirements for the Project Index Table.

Table C.15. Example Project Index Table Construction and Data Requirements

Column Name	Field Description	Data Type	Data Type Requirements
plan_id	A unique value identifying the plan.	NVARCHAR(255)	Must match Plan Table
project_id	A unique value identifying the Undergrounding Project.	NVARCHAR(255)	Must match Project Table
portfolio_id	A unique value identifying the portfolio.	NVARCHAR(255)	Must match current Portfolio Table
circuit_segment_id	A unique value identifying the Circuit Segment ID.	NVARCHAR(255)	must Must match Project Table
circuit_id	A unique value identifying the Circuit.	NVARCHAR(255)	must Must match Project Table
county	County of location of this Undergrounding Project.	TEXT	Separate with commas if multiple
project_category	The category of the Undergrounding Project. Acceptable values are: • High-Risk Project • Ignition Tail Risk Project • High Frequency Outage Program Project	NVARCHAR(255)	Limited values

Column Name	Field Description	Data Type	Data Type Requirements
	• Wildfire Rebuild		
is_confirmed_project	Whether this Undergrounding Project has passed Screen 3 as of this submission.	BOOLEAN	
is_prioritized_project	Whether this Undergrounding Project has passed Screen 4 as of this submission.	BOOLEAN	
project_priority	Prioritization level of the Undergrounding Project, according to the prioritization scheme defined in the EUP.	TEXT	Blank if the Undergrounding Project has not passed Screen 4
hftd_tier	A value representing the CPUC High Fire-Threat District (HFTD) area. Below are the integer values with the associated meaning. Acceptable values are the following: • HFTD Tier 2 • HFTD Tier 3 • Non-HFTD	NVARCHAR(32)	limited values
circuit_segment_length	Length of the full Circuit Segment on which this project was defined, in miles.	REAL	
The following columns are compilations of PUC metrics for the performance of the planned project from Screen 2 (assuming 100% undergrounded), and from Screen 4 (final values for the project as scoped).			

Column Name	Field Description	Data Type	Data Type Requirements
100_percent_UG_total_costs	Total Undergrounding Project Cost for initial Screen 2 estimate.	REAL	Dollarized Value
100_percent_UG_total_risk_reduction	Risk Reduction of the mitigation per D.22-12-027.	REAL	Dollarized Value
100_percent_UG_cost_benefit_ratio	Cost-Benefit Ratio of the Undergrounding Project per D.22-12-027. Benefits must relate to the mitigation of overhead line miles not miles of undergrounding for initial Screen 2 estimate.	REAL	
project_as_scoped_percent_UG	Percent of Circuit Segment's original unmitigated overhead line that will be removed and replaced with undergrounded line, according to scoped Screen 3 estimate	REAL	Leave blank if project has not yet passed Screen 3
project_as_scoped_total_costs	Total Undergrounding Project Cost for initial Screen 2 estimate.	REAL	Dollarized Value, Leave blank if project has not yet passed Screen 4
project_as_scoped_total_risk_reduction	Risk Reduction of the mitigation per D.22-12-027.	REAL	Dollarized Value, Leave blank if project has not yet passed Screen 4
project_as_scoped_cost_benefit_ratio	Cost-Benefit Ratio of the Undergrounding Project per D.22-12-027. Benefits must relate to the mitigation of overhead line miles not miles of undergrounding for	REAL	Leave blank if project has not yet passed Screen 4

Column Name	Field Description	Data Type	Data Type Requirements
	initial Screen 2 estimate.		
The following columns are compilations of metrics for the performance of the alternatives considered in Screen 2 (assuming 100% undergrounded), and in Screen 4 (for the alternative developed in Screen 3). The following columns are repeated three times, with <alt> replaced by 'screen_2_alt_1', 'screen_2_alt_2','screen_3_alt', The 'screen_3_alt' columns are to be left blank until the project has passed Screen 4.			
<alt>_work_type_description	Description of the type of mitigation considered for this alternative	TEXT	
<alt>_total_costs	Total Alternative Project Cost for initial Screen 2 estimate.	REAL	Dollarized Value
<alt>_total_risk_reduction	Risk Reduction of the mitigation per D.22-12-027.	REAL	Dollarized Value
<alt> _cost_benefit_ratio	Cost-Benefit Ratio of the Undergrounding Project per D.22-12-027. Benefits must relate to the mitigation of overhead line miles not miles of undergrounding for initial Screen 2 estimate.	REAL	
The following columns are compilations of information on the project as scoped and the primary alternative considered, as reported in Screen 3.			
baseline_cumulative_risk	Risk which would accumulate on this circuit over 55 years assuming no project done	REAL	Leave blank if project has not yet passed Screen 3
project_as_scoped_cumulative_risk	Risk which would accumulate on this	REAL	Leave blank if project has not yet passed Screen 3

Column Name	Field Description	Data Type	Data Type Requirements
	circuit over 55 years assuming project is done as scoped		
screen_3_alt_cumulative_risk	Risk which would accumulate on this circuit over 55 years assuming the "Screen 3 alternative" is carried out as scoped	REAL	Leave blank if project has not yet passed Screen 3

Additional requirements for the Project Index Table are as follows:

a) The rows of this table are every Undergrounding Project which has passed Screen 2.
b) This table must be updated and the values recalculated if the CPUC definitions of any of the above terms are changed or updates to the Risk Model Version would change their values.

C.2 Description of JSON Data Submissions

This section establishes the requirements for JSON Data Submissions. As part of Progress Report 0 and with each Progress Report, the Large Electrical Corporation must submit two required JSON files. The format is described in the section below and a sample is provided in Energy Safety's template files, which are available on Energy Safety's website.

C.2.1 Project Variable Modifiers JSON

The first JSON file is for the Portfolio Table and must include all estimates pertaining to undergrounding and other mitigation efforts. The required format for this JSON file is as follows:

At the top level, the JSON structure comprises the PLAN_ID, RISK_MODEL_VERSION_ID, RISK_MODEL_CALIBRATION_ID, and the file submission date, alongside each type of mitigation considered, including undergrounding and all alternatives outlined in Section 2.8.5.2. The main body of each JSON object in this file must be nested as follows, with top-level key "Mitigation Types".

- For each mitigation type:

  At the second level, the Large Electrical Corporation must separate the two variable classifications: "Model Input Variables" and "Model Output Variables."

- For each classification:

  At the third level, the Large Electrical Corporation must incorporate the sub-models earmarked for modification, such as the Ignition Likelihood Model or equipment model, as specified by the Large Electrical Corporation. Regarding outputs, the Large Electrical Corporation must use the single key "Model Output."

- For each submodel:

  The fourth level consists of the unique SUBMODEL_ID of the model, and the key "Variables." For "Model Output," the SUBMODEL_ID remains "null." The value for the key "Variables" must be each variable affected by the mitigation procedure. On the input side, the Large Electrical Corporation must provide only the inputs influenced by this mitigation, not the entire list of all inputs to the submodel. On the output side, the variables must be the full list of KDMMs, even if they are not affected by this mitigation.

- For each variable:

  The fifth level must include, for input variables, the keys "Type of Change" and "Explanation," containing strings representing a quantitative change and a qualitative explanation, respectively. These explanations must be detailed enough for reviewers without access to the full modeling procedure to understand. For output variables, the only required key is “Type of Change”. If no change occurs, these values must be "null." Additionally, output variables may include uncertainties indicated by a "+/-" character or another measurement of uncertainty.

Figure C.1 shows an example JSON file for Project Variable Modifiers and includes comments on the individual elements to be submitted for illustrative purposes. The Large Electrical Corporation must omit the comments in its submission.

Figure C.1. Commented Example JSON file for Project Variable Modifiers

```
{
  "comment_1": "*** NOTE: this sample JSON file is being
              submitted with comments submitted as text
              for clarity. Comments are to be omitted
              in the final submission. ***",
  "plan_id": "TestUtilityPlan1",
  "comment_2": "*** The plan_id must match the value in the
              Plan table (Table 1). ***",
  "KDMMs": "KDMM1,KDMM2,KDMM3",
  "comment_3": "*** Comma-separated list of KDMMs by
              number. This list of KDMMs be the same length
              as the list of KDMMs submitted in the
              KDMM table (Table 2) and the EUP
              submission. ***",
  "KDMM_names": "Overall Utility Risk,Ignition Consequence,Outage Program Likelihood",
  "comment_4": "*** Comma-separated list of KDMMs by name.
              This list of KDMMs must exactly match
              the list of KDMMs submitted in the KDMM
              table (Table 2) and the EUP submission. ***",
  "risk_model_version_ID": "v0.0",
  "risk_model_calibration_ID": "c0",
  "comment_5": "*** This version and calibration ID must
              match the current (last) row of the Risk
              Model Versions Table (Table 3). ***",
  "Mitigation Types": {
    "comment_6": "*** In this dictionary, all mitigation
              types are listed, using their names as keys. ***",
    "Undergrounding": {
      "comment_7": "*** In this dictionary, there are two
              classifications for variables, \"Model Input
              Variables\" and \"Model Output Variables\". ***",
      "Model Input Variables": {
        "comment_8": "*** In this dictionary, we list all the
              sub-models which are affected by doing this
              mitigation. ***",
        "Equipment Model": {
          "comment_9": "*** In this dictionary, the submodel_id is
              listed (if the submodel is not \"Model
              Output\"), and there is a single key
              \"Variables\". ***",
          "Submodel_id": 29303952,
          "Variables": {
            "comment_10": "*** In this dictionary, all relevant
              variables are listed. For the input variables,
              this is only whatever variables are
              actually affected by this mitigation. On
              the output variables, all KDMMs must be
              listed. ***",
            "Self-Combustion Likelihood": {
              "Type of Change": "-94 +/- 3%",
              "Explanation": "It affects the model at a hyperparameter level."
            }
          }
        },
        "Ignition Likelihood Model": {
          "Submodel_id": 29939992,
          "Variables": {
            "Contact From Vegetation": {
              "Type of Change": "-96%",
              "Explanation": "It affects the model at a hyperparameter level."
            },
            "Contact From Object": {
              "Type of Change": "-94%",
              "Explanation": "It affects the model at a hyperparameter level."
```

```
            }
          }
        }
      },
      "Model Output Variables": {
        "comment_13": "*** In this dictionary, we have a single
            key \"Model Output\" which should be
            affected by doing this mitigation. ***",
        "Model Output": {
          "Submodel_id": null,
          "Variables": {
            "Overall Utility Risk": {
              "Type of Change": "-90% +/- 5%"
            },
            "Ignition Consequence": {
              "Type of Change": null
            },
            "Outage Program Likelihood": {
              "Type of Change": "-40% +/- 5%"
            }
          }
        }
      }
    },
    "Covered Conductor + Fast Trip": {
      "Model Input Variables": {
        "Ignition Likelihood Model": {
          "Submodel_id": 19329332,
          "Variables": {
            "Contact From Vegetation": {
              "Type of Change": "-70%",
              "Explanation": "It affects the model at a hyperparameter level."
            }
          }
        }
      },
      "Model Output Variables": {
        "Model Output": {
          "Submodel_id": null,
          "Variables": {
            "Overall Utility Risk": {
              "Type of Change": "-60% +/- 5%"
            },
            "Ignition Consequence": {
              "Type of Change": null
            },
            "Outage Program Likelihood": {
              "Type of Change": "-20% +/- 5%"
            }
          }
        }
      }
    },
    "Vegetation Anihillation": {
      "Model Input Variables": {
        "Vegetation Growth Model": {
          "Submodel_id": 19329335,
          "Variables": {
            "Vegetation Zone": {
              "Type of Change": "-1",
              "Explanation": "This PVM changes the classification of the
              growth zone. It affects the model at a hyperparameter level."
            }
          }
        }
```

```
        }
      },
      "Model Output Variables": {
        "Model Output": {
          "Submodel_id": null,
          "Variables": {
            "Overall Utility Risk": {
              "Type of Change": "-50% +/- 5%"
            },
            "Ignition Consequence": {
              "Type of Change": "-30% +/- 5%"
            },
            "Outage Program Likelihood": {
              "Type of Change": "-10% +/- 1%"
            }
          }
        }
      }
    }
  }
}
```

C.2.2 Model Risk Landscape JSON

The Model Risk Landscape JSON contains the array of Key Decision-Making Metrics (KDMMs) utilized by the Large Electrical Corporation to assess the impact of the Undergrounding Project.

The Model Risk Landscape JSON file is for modeling all KDMMs affected by individual Confirmed Projects, projected over the years specified in Section 2.7.5 (Core Capability 4) of these Guidelines. The required format for this JSON file is as follows:

At the top level, the JSON structure comprises the PLAN_ID, PORTFOLIO_ID, RISK_MODEL_VERSION_ID, RISK_MODEL_CALIBRATION_ID, and the file submission date. It also includes information about the structure of the internal values, listing the set of years to be projected as a comma-separated list and shows the utilized KDMMs by number, by name, and finally by whether they are considered “cumulative” as described in Section 2.8.6.1 of these Guidelines.

The main body of each JSON object in this file must be nested as follows, with key “Projects”.

- For each PROJECT_ID:

  At the second level, there must be multiple potential mitigations of the Circuit Segment identified by the Project ID, including “Baseline,” “Project as scoped,” “Screen 3 Alternative,” “Undergrounding as scoped,” “Additional Comparison,” where these terms are all defined as in the Screen 3 Table (Appendix C.1.12).

- For each mitigation type:

  The third level must incorporate multiple “settings” (i.e. Separate, Collective, Ablation, or None) used to track the effects of individual projects: For the “Baseline”, all settings would be equivalent, so the only option is “No Setting”. For the “Project as scoped” i.e. the work proposed by the Large Electrical Corporation, the required settings are "Separate" (impact of the project alone), "Collective" (impact of the full

proposed portfolio as scoped), and "Ablation" (impact of the remainder of the portfolio without this project). For all other mitigations considered, the required settings are “Separate” and “Collective”.

- For each setting:

  The fourth level must contain the tracked KDMMs, matching those presented at the top level.

- For each KDMM:

  The KDMM is reported at two scales; the “project-level” scale and the “portfolio-level" scale.

- For each scale:

  The fifth level lists the calculated output types for this KDMM at this scale. If the KDMM is cumulative, according to the KDMM table and the list of KDMMs at the top level of this file, there are two outputs, “instantaneous” and “cumulative”. If the KDMM is non-cumulative, there is only one output, “value”.

- For each output:

  The sixth and final level is the output data, which must be a comma-separated list of decimal-precision real numbers. The number of entries in this list will exactly match the number of years in the “years” variable at the top level of this file. Each floating-point number represents this particular output, of this KDMM, at this scale, with this setting, for this mitigation type or alternative, for this Confirmed Project, at each of the specified years since Plan inception.

The Large Electrical Corporation must submit a single JSON file for the full suite of Confirmed Projects in its portfolio. Figure C.2 shows an example JSON file and includes comments on the individual elements to be submitted for illustrative purposes. The Large Electrical Corporation must omit the comments in its submission.

Figure C.2. Example JSON File with Commented Explanation

```
{
  "comment_1": "*** NOTE: this sample JSON file is being
    submitted with comments submitted as text
    for clarity. Comments are to be omitted
    in the final submission. ***",
  "plan_id": "TestUtilityPlan1",
  "portfolio_id": "P1",
  "comment_2": "*** The plan_id and portfolio_id must match
    the values in the Plan and Portfolio
    tables (Table 1 and 4), respectively. ***",
  "Years": "0,1,2,3,4,5,6,7,8,9,10,15,20,25,30,35,40,45,50,55",
  "comment_3": "*** Comma-separated list of values. This
    list of years is specified by Section 2.7.5.
    These years are static as the plan
    moves, i.e. year 0 always refers to the Plan
    start date. ***",
  "KDMMs": "KDMM1,KDMM2,KDMM3,KDMM4,KDMM5,KDMM6,KDMM7,KDMM8,KDMM9,KDMM10",
  "comment_4": "*** Comma-separated list of KDMMs by
    number. This list of KDMMs be the same length
    as the list of KDMMs submitted in the
    KDMM table (Table 2) and the EUP
    submission. ***",
  "KDMM_names": "Overall Utility Risk,Ignition Risk,
                 Ignition Likelihood,Ignition Consequence,
                 Outage Program Risk,
                 Outage Program Likelihood,
                 Outage Program Consequence,
                 Equipment Risk,
                 Total Benefits,
                 Reliability Benefits",
  "comment_5": "*** Comma-separated list of KDMMs by name.
    This list of KDMMs must exactly match
    the list of KDMMs submitted in the KDMM
    table (Table 2) and the EUP submission. ***",
  "risk_model_version_ID": "v0.0",
  "risk_model_calibration_ID": "c0",
  "comment_6": "*** This version and calibration ID must
    match the current (last) row of the Risk
    Model Versions Table (Table 3). ***",
  "KDMM_is_cumulative": {
    "comment_7": "*** Short dictionary describing whether a
    KDMM accumulates over time, with KDMM
    names as keys, \"true\" or \"false\" as values.
    Whether or not it is True must match
    the requirements described in Section XXX. ***",
    "Overall Utility Risk": true,
    "Ignition Risk": false,
    "Ignition Likelihood": true,
    "Ignition Consequence": false,
    "Outage Program Risk": false,
    "Outage Program Likelihood": true,
    "Outage Program Consequence": false,
    "Equipment Risk": true,
    "Total Benefits": true,
    "Reliability Benefits": true
  },
  "Projects": {
    "comment_8": "*** In this dictionary, all projects are
```

```
    listed, using their project_ids as keys. ***",
    "proj001": {
      "comment_9": "*** In this dictionary, all mitigation
    types (proposed project, baseline, and
    alternative mitigations) are listed, using
    the list of names specified in Section
    XXX. Additional alternatives may be added,
    but they must be defined in the EUP.
    Definitions: 1. Baseline: The evolution of
    risk on this Circuit Segment if no
    mitigations are planned or applied to any of
    the portfolio. 2. Scoped Project: The
    project as proposed and scoped. This may
    include multiple subprojects which may
    use multiple mitigation strategies, of
    which at least some must include
    undergrounding for the EUP.
    conductor additions. 3. Screen 3 Alternative:
    The potential project of doing the most
    efficient non-undergrounding work
    available, which may include remote grids,
    fast-trip settings, and other mitigation
    strategies. 4. Scoped Undergrounding: The
    project as proposed and scoped, but if
    only the undergrounding subprojects are
    finished. The full project may include
    multiple subprojects which may use
    different mitigation strategies, but here we
    track the evolution of KDMMs if only the
    undergrounding subprojects are carried
    out. ***",
      "Scoped Project": {
        "comment_10": "*** In this dictionary, all settings (No
    Setting, Seperate, Collective, and
    Ablation studies) are listed, as well as the
    total fraction of the project (as defined
    in Table C.12) which would be
    undergrounded with this mitigation type.
    Definitions: 1. No Setting: Because the baseline
    has no projects, there is no
    distinction between seperate, collective, etc. 2.
    Separate: Effects on the system for just
    implementing this single mitigation,
    with all other projects not taking place.
    3. Collective: Effects on the system for
    implementing this single mitigation,
    with all other projects taking place \"as
    scoped\", i.e. using the \"Scoped Project\"
    as described. 4. Ablation: Effects on
    the system for implementing all other
    projects taking place \"as scoped\", i.e.
    using the \"Scoped Project\" as described, but
    with this project in particular not
    taking place. ***",
        "Undergrounding Fraction": 0.6,
        "Separate": {
          "comment_11": "*** In this dictionary, all KDMMs are
    listed. These must match the KDMMs listed at
```

```
····the·top·level.·***",
··········"Overall·Utility·Risk":·{
···········"comment_12":·"***·In·this·dictionary,·the·two·scales·for·
····publication·(Project-level·and·
····Portfolio-level)·are·listed.·Definitions:·1.·
····Project-level:·the·value·of·all·KDMMs·for·
····this·specific·Circuit·Segment,·under·the·
····selected·setting.·2.·Portfolio-level:·the·
····sum·of·values·for·all·KDMMs·for·the·
····entire·set·of·Circuit·Segments·included·in·
····the·Portfolio·***",
···········"Project-level":·{
·············"comment_13":·"***·In·this·dictionary,·the·required·
····outputs·for·data·collection·(Instantaneous·&·
····Cumulative,·or·Value)·are·listed.·Which·
····outputs·are·required·for·each·KDMM·are·
····defined·in·Section·2.8.6.1.·Definitions:·1.·
····Instantaneous:·The·value·at·each·
····particular·year·for·this·KDMM.·2.·Cumulative:·The·
····integrated·or·summedvalue·at·each·
····particular·year·for·this·KDMM.·3.·Value:·If·
····instantaneous·and·cumulative·values·are·
····not·both·required,·this·output·is·used·
····instead·to·distinguish·the·cases.·It·is·
····calculated·as·the·value·at·each·particular·
····year·for·this·KDMM,·identically·to·how·
····\"instantaneous\"·was·defined.·***",
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              "Cumulative": "0,1,2,3,4,5,6,7,8,9,10,15,20,25,30,35,40,45,50,55"
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            }
          }
        }
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        "Separate": {
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              "Cumulative": "0,1,2,3,4,5,6,7,8,9,10,15,20,25,30,35,40,45,50,55"
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            "Portfolio-level": {
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            }
          }
        }
      }
    }
  }
}
```

C.3 Spatial Data Submissions

The Large Electrical Corporation must include spatial data with every Progress Report as described below. Template files to aid in submission of the data requirements are available on Energy Safety's website. The format of these files is in the form of a geodatabase (GDB), within which individual tables, such as those defined in Sections C.4.1 through C.4.6 below, are referred to as "feature classes". If the Large Electrical Corporation is unable to provide all feature classes required below in the format of the template files, file formats such as ".KMZ" or others may be submitted for the remaining feature classes. However, other file formats will be considered only if Energy Safety, at its sole discretion, determines that the submitted files adequately reflect all the information necessary for Plan evaluation, and if the Large Electrical Corporation outlines a timeline for transition to a GDB format during the duration of the EUP. Technical requirements for spatial data submissions are as follows:

a. Submit data in a single geodatabase (GDB).
b. Submit GDB files that are interoperable and compatible with standard industry practices.
c. Ensure all data attributes follow the schema required in Section 2.8.3.
d. Customize metadata as needed to follow the requirements in this document.
e. Use the WGS 1984 California (Teale) Albers (US Feet) projected coordinate system (WKID Esri 102599) for all data submitted.
f. With each Progress Report, the Large Electrical Corporation is not required to resubmit a feature class if no changes are made to that feature class.

g. Delete any feature classes and/or tables which are not used in this way (do not submit empty feature classes or tables).

h. Compress the GDB into a zipped folder and submit that folder to Energy Safety's SharePoint file transfer portal. Each Large Electrical Corporation will have a designated folder on Energy Safety's SharePoint site for this purpose.

i. Name the GDB according to the following convention:

    i. "[Large Electrical Corporation Abbreviation]PR#_Date_R#",

        1. *for example:* "PGE_PR1_2025-01-01_R0.gdb.zip"

The Large Electrical Corporation must ensure location accuracy in its GIS data submissions, including, but not limited to:

a. All records in feature classes must include geometry.

b. Horizontal locations reported in feature classes must be within 20 meters of actual locations as established using a commercially available GNSS receiver in the current epoch of the WGS84 datum under conditions where the receiver's estimated horizontal positional error is 5 meters or less.

C.4 GIS Data Schema

The Large Electrical Corporation must report its geospatial data in accordance with the data schema provided below.

C.4.1 Circuit Segment (Line Feature Class)

The Large Electrical Corporation must report all Circuit Segments representing its entire distribution system as a spatial data submission. Each record in this feature must match with one and only one row of the Circuit Segment Identification Table and be identified by the same CIRCUIT_SEGMENT_ID. This feature class must consolidate each Circuit Segment to a single row which includes both primary and secondary distribution lines. This table must reflect the most current modeling information (see Section 2.4.2.1) as of each Progress Report submission.

Table C.16. Circuit Segment GIS Data

Field Name	Field Description
utility_name	Large electrical corporation abbreviation. Acceptable values are the following: • PG&E • SDG&E • SCE

Field Name	Field Description
	This field is required.
plan_id	Unique value identifying the plan. Must match ID in Plan Table. This field is required.
circuit_id	Unique ID for a specific Circuit on which the Circuit Segment is located. Must be a traceable stable ID within the electrical corporation's operations/processes. Primary Key for the feature class if the electrical corporation does not uniquely identify segments with persistent IDs. This field is required.
circuit_segment_id	Unique ID for the Circuit Segment. This Circuit Segment must be available in the Circuit Segments list at the time of the vintaging.
internal_circuit_segment_id	If the large electrical corporation reuses internal names for Circuit Segments in a non-unique way, or otherwise uses another set of names besides the circuit_segment_id as defined in C.1, report that name here. However, the circuit_segment_id must append the 8-digit minting date to this field as described in the introduction of Appendix C.

C.4.2 Confirmed Project Polygon (Polygon Feature Class)

The Large Electrical Corporation must report each Confirmed Project as a polygon, which is designed to encompass the entire Circuit Segment the Undergrounding Project was defined on, minus any overlap with existing Confirmed Project Polygons. Each row of this table must match with one and only one row of the Project Table and be identified by the same PROJECT_ID.

Table C.17. Project GIS Data

Field Name	Field Description
utility_name	Large Electrical Corporation abbreviation. Acceptable values are the following: • PG&E • SDG&E • SCE

Field Name	Field Description
	This field is required.
project_id	A unique value identifying the Confirmed Project. Must match ID used in Project Table. This field is required.
plan_id	Unique value identifying the plan. Must match ID in Plan Table. This field is required.
portfolio_id	Unique value identifying the current portfolio. Must match Portfolio Table. This field is required.
circuit_id	Unique ID for the specific Circuit on which the Undergrounding Project was defined. This Circuit must have been submitted in the Circuit Segments list in the Progress report listed in circuit_segment_vintage.
circuit_segment_id	Unique ID for the specific Circuit Segment on which the Undergrounding Project was defined. This Circuit Segment must have been submitted in the Circuit Segments list in the Progress report listed in circuit_segment_vintage.
circuit_segment_vintage	Number of the Progress Report when this Undergrounding Project was defined.

Additional requirements for the construction of the Confirmed Project Polygon feature class are as follows:

a) Circuit Segments must be reasonably, and completely, bounded by the Confirmed Project Polygon, which may be created algorithmically, manually, or using any other process the Large Electrical Corporation utilizes. However, the vertices in some cases may be required to be manually adjusted to minimize overlapping. The exception to the completeness requirement is if a new Circuit Segment is already partially included in an existing Confirmed Project (see below).

b) Confirmed Project Polygons must be defined to include only assets associated with the Circuit Segment their Confirmed Project is defined on. The Large Electrical Corporation must manually remove any overlap from other Circuit Segments, unless avoiding overlap with other Circuit Segments is not possible (e.g. crossing Circuit Segments, shared equipment, etc).

c) Confirmed Project Polygons cannot overlap with one another except at shared vertices, unless creating non-overlapping polygons is completely unfeasible (e.g. crossing Circuit Segments, shared equipment, etc).
d) The Confirmed Project Polygon does not need to be redrawn due to changes in Circuit Segment topology, even if these changes cause one or more Circuit Segments to partially or completely overlap with a Confirmed Project Polygon. The Confirmed Project Polygon defines the boundary of pre-mitigation lines that can be mitigated as part of this Confirmed Project.
e) If a Circuit Segment already overlaps with an existing Confirmed Project Polygon when it is considered for undergrounding within the EUP, the risk modeling on this Circuit Segment must only consider the portion not overlapping with any existing Confirmed Project, and if confirmed, the Confirmed Project Polygon based on this Circuit Segment will be drawn only around the portion not overlapping with any existing Confirmed Project Polygon.
f) Confirmed Project Polygons are not to be edited in subsequent submissions. Any change to a Confirmed Project Polygon is considered a new Undergrounding Project and must be passed through the screens again.

C.4.3 Pre-mitigation Overhead Conductor (Line Feature Class)

The Large Electrical Corporation must report the existing overhead line associated with each Subproject appearing in the Subproject Table. This feature class reports the Subproject before mitigations took place.

Table C.18. Pre-mitigation Overhead Conductor GIS Data

Field Name	Field Description
utility_name	Large Electrical Corporation abbreviation. Acceptable values are the following: • PG&E • SDG&E • SCE This field is required.
subproject_id	Unique ID of the portion of overhead line to be mitigated in working on this Subproject. Must be a unique value that identifies this portion of the circuit and a traceable stable ID within the electrical corporation's operations/processes. This field must also match the ID used in the Subproject Table. This field is required.

Field Name	Field Description
pre_mitigation_alignment_id	Integer representing the versioning of this Subproject. If the length or endpoints of this Subproject change in future Progress Reports, a new pre_mitigation_alignment_id will be used. After construction, this no longer updates, and represents the final pre-mitigation line mitigated by this Subproject. This must match the pre_mitigation_alignment_id in the Subproject Table. This field is required.
project_id	A unique value identifying the Undergrounding Project. Must match ID used in Project Table. This field is required.
plan_id	Unique value identifying the plan. Must match ID in plan. This field is required.
portfolio_id	Unique value identifying the current portfolio. Must match Portfolio Table. This field is required.
line_class	Class of line contained in Subproject planned for undergrounding. Possible values: • OH-P • OH-S • UG-P • UG-S This field is required.
circuit_id	Unique ID for the specific Circuit on which this Undergrounding Project was defined. Primary Key for the feature class if the electrical corporation does not uniquely identify segments with persistent IDs. This field is required.
circuit_segment_id	Unique ID for the specific Circuit Segment on which the Undergrounding Project was defined. This field is required.

Additional requirements for the Pre-mitigation Overhead Conductor feature class are as follows:

a) Subprojects described in this feature class must fall within the bounds of the associated Confirmed Project Polygon, as described in C.4.2, unless an explanation for exceeding the boundaries is given, as described in C.1.14.
b) A new PRE_MITIGATION_ALIGNMENT_ID is issued for any change in the location of any endpoints of the Line GIS object.
c) The abbreviations in the “LINE_CLASS” variable represent the following: OH-P: Overhead Primary Distribution, OH-S: Overhead Secondary Distribution, UG-P: Underground Primary Distribution, UG-S: Underground Secondary Distribution.

C.4.4 Pre-mitigation Assets (Point Feature Class)

The Large Electrical Corporation must report some overhead assets other than conductor identified for removal/undergrounding: capacitor banks, fuses, switches/reclosers, transformers, and support structures. In this feature class, each row is an individual piece of equipment which is currently operationally attached to a specific Subproject and is intended to be moved, removed, or deenergized.

Table C.19. Pre-mitigation Assets GIS Data

Field Name	Field Description
utility_name	Large Electrical Corporation abbreviation. Acceptable values are the following: • PG&E • SDG&E • SCE This field is required.
subproject_id	Unique ID of the portion of overhead line to be mitigated in working on this Subproject. Must be a unique value that identifies this portion of the Circuit and a traceable stable ID within the electrical corporation's operations/processes. This field must also match the ID used in the Subproject Table. This field is required.
pre_mitigation_alignment_id	Integer representing the versioning of this Subproject. If the length or endpoints of this Subproject change in future Progress Reports, a new pre_mitigation_alignment_id will be used. After construction, this reflects the pre-construction assets that have since been moved or removed. This must match the pre_mitigation_alignment_id in the Subproject Table. This field is required.
project_id	A unique value identifying the Undergrounding Project. Must match ID used in Project Table. This field is required.
plan_id	Unique value identifying the plan. Must match ID in plan. This field is required.
portfolio_id	Unique value identifying the portfolio. Must match Portfolio Table. This field is required.

Field Name	Field Description
circuit_id	Unique ID for the specific Circuit on which this Undergrounding Project was defined. Primary Key for the feature class if the electrical corporation does not uniquely identify segments with persistent IDs. This field is required.
circuit_segment_id	Unique ID for the specific Circuit Segment on which the Undergrounding Project was defined. This field is required.
asset_type	Type of asset represented. Acceptable values: • Capacitor bank • Fuse • Switchgear • Transformer • Support structure This field is required.

Additional requirements for the Pre-mitigation Assets feature class are as follows.

a) All equipment in each Subproject described in this feature class must fall within the bounds or along the edge of the associated Confirmed Project Polygon, as described in C.4.2, unless an explanation for exceeding the boundaries is given, as described in C.1.14.
b) Changes to the PRE_MITIGATION_ALIGNMENT_ID are determined by C.4.3, the current submission must match the PRE_MITIGATION_ALIGNMENT_ID for each Subproject to the values in that table.

C.4.5 Post-mitigation Conductor (Line Feature Class)

The Large Electrical Corporation must identify the alignment of new mitigated conductor.

Table C.20. Post-mitigation Conductor GIS Data

Field Name	Field Description
utility_name	Large Electrical Corporation abbreviation. Acceptable values are the following: • PG&E • SDG&E • SCE

Field Name	Field Description
	This field is required.
subproject_id	Unique ID of the portion of overhead line to be mitigated in working on this Subproject. Must be a unique value that identifies this portion of the circuit and a traceable stable ID within the electrical corporation's operations/processes. This field must also match the ID used in the Subproject Table. This field is required.
post_mitigation_alignment_id	Integer representing the versioning of this Subproject. If the length or endpoints of this Subproject change in future Progress Reports, a new post_migitation_alignment_id will be used. After construction, this no longer updates, and represents the final post-mitigation line installed through this Subproject. This must match the post_mitigation_alignment_id from the Subproject Table. This field is required.
project_id	A unique value identifying the Undergrounding Project. Must match ID used in Project Table. This field is required.
plan_id	Unique value identifying the plan. Must match ID in plan. This field is required.
portfolio_id	Unique value identifying the current portfolio. Must match Portfolio Table. This field is required.
line_class	Class of line contained in Subproject planned for undergrounding. Possible values: • OH-P • OH-S • UG-P • UG-S This field is required.
circuit_id	Unique ID for the specific Circuit on which this Undergrounding Project was defined. Primary Key for the feature class if the electrical corporation does not uniquely identify segments with persistent IDs. This field is required.
circuit_segment_id	Unique ID for the specific Circuit Segment on which the Undergrounding Project was defined. This field is required.

Additional requirements for the Post-mitigation Conductor feature class are as follows:

a) Subprojects described in this feature class must serve roughly the same region and customers as the overhead conductor Subproject they are replacing. However, some variation in this is permitted. Additionally, the newly installed line is not required to fall entirely within the Confirmed Project Polygon feature.
b) A new POST_MITIGATION_ALIGNMENT_ID is issued for any change in the location of any endpoints of the Line GIS object.
c) The abbreviations in the "LINE_CLASS" variable represent the following: OH-P: Overhead Primary Distribution, OH-S: Overhead Secondary Distribution, UG-P: Underground Primary Distribution, UG-S: Underground Secondary Distribution.

C.4.6 Post-mitigation Assets (Point Feature Class)

The Large Electrical Corporation must identify new installations of the following assets: capacitor banks, fuses, switches/reclosers, transformers, and support structures. In this feature class, each row is an individual piece of newly installed or moved equipment which will be or has been attached to a specific Subproject after the mitigation is carried out.

Table C.21. Post-mitigation Assets GIS Data

Field Name	Field Description
utility_name	Large Electrical Corporation abbreviation. Acceptable values are the following: • PG&E • SDG&E • SCE This field is required.
subproject_id	Unique ID of the portion of overhead line to be mitigated in working on this Subproject. Must be a unique value that identifies this portion of the circuit and a traceable stable ID within the electrical corporation's operations/processes. This field must also match the ID used in the Subproject Table. This field is required.
post_mitigationalignment_id	Integer representing the versioning of this Subproject. If the length or endpoints of this Subproject change in future Progress Reports, a new post_mitigation_alignment_id will be used. After construction, this reflects the post-construction assets that have been moved or installed. This must match the post_mitigation_alignment_id from the Subproject Table. This field is required.

Field Name	Field Description
project_id	A unique value identifying the Undergrounding Project. Must match ID used in Project Table. This field is required.
plan_id	Unique value identifying the plan. Must match ID in plan. This field is required.
portfolio_id	Unique value identifying the portfolio. Must match Portfolio Table. This field is required.
circuit_id	Unique ID for the specific Circuit on which this Undergrounding Project was defined. Primary Key for the feature class if the electrical corporation does not uniquely identify segments with persistent IDs. This field is required.
circuit_segment_id	Unique ID for the specific Circuit Segment on which the Undergrounding Project was defined. This field is required.
asset_type	Type of asset represented. Acceptable values: • Capacitor bank • Fuse • Switchgear • Transformer • Support Structure This field is required.

Additional requirements for the Post-mitigation Assets feature class are as follows:

a) Changes to the POST_MITIGATION_ALIGNMENT_ID are determined by C.4.5, the current submission must match the POST_MITIGATION_ALIGNMENT_ID for each Subproject to the values in that table.