Laura M. Fulton
Senior Counsel
8330 Century Park Court, CP32F
San Diego, CA 92123-1548

LFulton@SDGE.com

May 16, 2025

VIA E-FILING **Docket #2026-2028-Base-WMPs**

Tony Marino, Deputy Director
Office of Energy Infrastructure Safety
715 P Street, 20th Floor
Sacramento, CA 95814

RE: San Diego Gas & Electric Company's 2026-2028 Base Wildfire Mitigation Plan Substantive and Non-substantive Errata

Dear Deputy Director Marino:

Pursuant to Section 7 of the Office of Energy Infrastructure Safety's ("Energy Safety") Process Guidelines, San Diego Gas & Electric's ("SDG&E") hereby submit its substantive and non-substantive errata to its 2026-2028 Base Wildfire Mitigation Plan ("WMP").[1] The table below lists each substantive and non-substantive errata and a redline (shown in red and blue font) of the relevant pages showing the corrections are included as Attachment A. SDG&E is also submitting a revised Excel workbook of its Appendix G supporting data, which is not in redline given the numerous formulas throughout the Excel workbook.

Please note that references to pages numbers in other tables throughout SDG&E's WMP have been automatically updated to reflect the errata further described below but will be reflected in SDG&E's final WMP submission.

SDG&E appreciates Energy Safety's inclusion of SDG&E's errata to its WMP submission.

Respectfully submitted,

/s/ Laura M. Fulton

Attorney for
San Diego Gas and Electric Company

[1] SDG&E's 2026-2028 Base WMP is also available at SDG&E's website: https://www.sdge.com/2026-2028-wildfire-mitigation-plan

Table of SDG&E's Substantive and Non-substantive Errata to its 2026-2028 Base WMP

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
1	Non-substantive	Executive Summary (p. 1)	Corrected weather stations from 222 to 223 due to inadvertent typo
2	Substantive	SDGE Table 5-8 (p. 62);	Updated table and introductory narrative to be specific to the 2026-2028 WMP cycle and to match the status and target deadline (EOY) of the recommendations in ACI SDGE-25U-03 tables. Also added an "ID" column to match the recommendations in ACI SDGE-25U-03 tables.
3	Substantive	SDGE Table 5-9 (previously p. 66, as updated to p. 67);	Updated table name, table, and introductory narrative to be specific to the 2026-2028 WMP cycle and to match the status and target deadline (EOY) of the recommendations in ACI SDGE-25U-03 tables. Also revised the IDs in the "ID" column to match the recommendations in ACI SDGE-25U-03 tables.
4	Substantive	SDGE Table 6-1 (previously p. 89, as updated to p. 91)	Updated mitigation effectiveness values to reflect revised assumptions to align with SDG&E's RAMP filing submitted on May 15, 2025. Specifically, adjusted the effectiveness of vegetation control mitigations from 1% to 4.95%, as described in items 25 through 29. Additionally, added the "Vegetation Detailed Inspections" mitigation as it was inadvertently omitted in the previous version.

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
5	Non-substantive	Figure 6-2 (previously p. 100, as updated to p. 102)	Updated text in the figure to provide additional process detail
6	Non-substantive	Figure 6-4 (previously p. 110, as updated to p. 113)	Added target numbers to bar graph to provide additional clarity.
7	Substantive	OEIS Table 6-3 (previously p. 111, as updated to p. 115)	Changes to Activity Effectiveness – Overall Risk and Activity Effectiveness – Wildfire Risk and Expected % Risk Reduction columns are due to updates on Mitigation Effectiveness values as explained in items 8 & 9
8	Substantive	OEIS Table 8-1 (previously p. 126, as updated to p. 130)	Minor updates in Mitigation Units to align with RAMP 2025
9	Substantive	Section 8.2.1.3 (previously p. 131, as updated to p. 135)	Minor updates in Mitigation Units to align with RAMP 2025
10	Substantive	OEIS Table 9-2 (previously p. 208, as updated to p. 212)	Due to changes in assumptions regarding effectiveness of vegetation control mitigations to align with RAMP 2025, as described in items 25 through 29.
11	Non-substantive	OEIS Table 9-6 (previously p. 224, as updated to p. 228)	Edited second footnote for clarity
12	Substantive	Section 9.12.3 (previously p. 228, as updated to p. 232)	Updated description of data reported in Tables 9-7 and 9-8. To better understand the trend of the past due work order for 2026-2028, OEIS Table 9-7 and OEIS Table 9-8 now show the average number of tree units within the HFTD that were past due at the end of years 2022, 2023, and 2024, rather than only past due work orders at the end of 2024.
13	Substantive	OEIS Table 9-7 (previously p. 228, as updated to p. 232)	Corrected error from reporting total number of open work orders to past due work orders.

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
14	Substantive	OEIS Table 9-8 (previously p. 228, as updated to p. 232)	Corrected error from reporting total number of open work orders to past due work orders.
15	Non-substantive	OEIS Table 9-9 (p. 230, 231, as updated to p. 234, 235)	Corrected the # of Contracted Employees with Min Quals column for three Worker Titles. Error was related to the number of employees who possess specific certifications rather than a requirement of employment.
16	Non-substantive	Appendix D (ACI SDGE-25U-03, Tables 4-1 and 4-2) (p. 10 and 17)	Updated table names and tables to include all third-party recommendations and match the status of the recommendations with SDGE Table 5-8 and 5-9 in the WMP
17	Non-substantive	Appendix D (ACI SDGE-25U-04) (Attachment A "Joint IOU Grid Hardening Working Group Report: Update for 2026-2028 Wildfire Mitigation Plan" , p. 12)	Corrected typo in combined effectiveness equation
18	Non-substantive	Appendix G (p.1)	Corrected link in to https://www.sdge.com/2026-2028-wildfire-mitigation-plan to reflect the correct URL
19	Substantive	Appendix G Excel file; Added tab [SUG-2028-comp]	Added 2028 Strategic Undergrounding (SUG) comparison tab to calculate CBR comparisons between Combined Covered Conductors (CCC) and SUG mitigations on feeder segments where both are present – sister update to item 20.
20	Substantive	Appendix G Excel file; Added tab [CCC-2028-comp]	Added 2028 Combined Covered Conductor (CCC) comparison tab to calculate CBR comparisons between Strategic Undergrounding (SUG) and CCC mitigations on

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
			feeder segments where both are present – sister update to item 19.
21	Substantive	Appendix G Excel file; Updated tab [SUG] in columns to the right of the Risk Reduction % column	Added pre- and post-mitigation LoRE (Likelihood of Risk Event) and CoRE (Consequence of Risk Event) values to show mitigation effectiveness and to align with RAMP 2025 filing requirements Update the Tranche ID Quintile to align with LoRE / CoRE quintile values ranging from 1-5 in each category to align with RAMP 2025 filing. Added Service Territory Risk Reduction % column that represents the risk reduction on the feeder segment as a part of the overall territory risk as discussed on May 15 between OEIS and SDG&E
22	Substantive	Appendix G Excel file; Updated tab [CCC] in columns to the right of the Risk Reduction % column	Added pre- and post-mitigation LoRE (Likelihood of Risk Event) and CoRE (Consequence of Risk Event) values to show mitigation effectiveness and to align with RAMP 2025 filing requirements Update the Tranche ID Quintile to align with LoRE / CoRE quintile values ranging from 1-5 in each category to align with RAMP 2025 filing. Added Service Territory Risk Reduction % column that

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
			represents the risk reduction on the feeder segment as a part of the overall territory risk as discussed on May 15 between OEIS and SDG&E
23	Substantive	Appendix G Excel file; Added tab [Distribution_Underbuilt]	Added Distribution_Underbuilt – Risk & Cost Benefit to include information regarding the effectiveness of this specific mitigation and to align with RAMP 2025 filing requirements
24	Substantive	Appendix G Excel file; Updated tab [OH Hardening] in columns to the right of the Risk Reduction % column	Added pre- and post-mitigation LoRE (Likelihood of Risk Event) and CoRE (Consequence of Risk Event) values to show mitigation effectiveness and to align with RAMP 2025 filing requirements Update the Tranche ID Quintile to align with LoRE / CoRE quintile values ranging from 1-5 in each category to align with RAMP 2025 filing. Added Service Territory Risk Reduction % column that represents the risk reduction on the feeder segment as a part of the overall territory risk as discussed on May 15 between OEIS and SDG&E
25	Substantive	Appendix G Excel file; Updated tab [Pole-Clearing] in columns to the right of the Risk Reduction % column Changed mitigation	Added pre- and post-mitigation LoRE (Likelihood of Risk Event) and CoRE (Consequence of Risk Event) values to show mitigation effectiveness and to align with

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
		effectiveness estimate assumption in cell K11 from 1% to 4.95%	RAMP 2025 filing requirements Update the Tranche ID Quintile to align with LoRE / CoRE quintile values ranging from 1-5 in each category to align with RAMP 2025 filing. Added Service Territory Risk Reduction % column that represents the risk reduction on the feeder segment as a part of the overall territory risk as discussed on May 15 between OEIS and SDG&E Changed mitigation effectiveness estimate assumption in cell K11 from 1% to 4.95% to align with RAMP 2025 filing.
26	Substantive	Appendix G Excel file; Updated tab [Fuel_Management] in columns to the right of the Risk Reduction % column Changed mitigation effectiveness estimate assumption in cell K11 from 1% to 4.95%	Added pre- and post-mitigation LoRE (Likelihood of Risk Event) and CoRE (Consequence of Risk Event) values to show mitigation effectiveness and to align with RAMP 2025 filing requirements Update the Tranche ID Quintile to align with LoRE / CoRE quintile values ranging from 1-5 in each category to align with RAMP 2025 filing. Added Service Territory Risk Reduction % column that represents the risk reduction on the feeder segment as a part of the overall territory risk as discussed on May 15 between OEIS and SDG&E

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
			Changed mitigation effectiveness estimate assumption in cell K11 from 1% to 4.95% to align with RAMP 2025 filing.
27	Substantive	Appendix G Excel file; Updated tab [Trim_and _Removal] in columns to the right of the Risk Reduction % column Changed mitigation effectiveness estimate assumption in cell K11 from 1% to 4.95%	Added pre- and post-mitigation LoRE (Likelihood of Risk Event) and CoRE (Consequence of Risk Event) values to show mitigation effectiveness and to align with RAMP 2025 filing requirements Update the Tranche ID Quintile to align with LoRE / CoRE quintile values ranging from 1-5 in each category to align with RAMP 2025 filing. Added Service Territory Risk Reduction % column that represents the risk reduction on the feeder segment as a part of the overall territory risk as discussed on May 15 between OEIS and SDG&E Changed mitigation effectiveness estimate assumption in cell K11 from 1% to 4.95% to align with RAMP 2025 filing.
28	Substantive	Appendix G Excel file; Updated tab [Off_Cycle_Patrol] in columns to the right of the Risk Reduction % column Changed mitigation effectiveness estimate	Added pre- and post-mitigation LoRE (Likelihood of Risk Event) and CoRE (Consequence of Risk Event) values to show mitigation effectiveness and to align with RAMP 2025 filing requirements

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
		assumption in cell K11 from 1% to 4.95%	Update the Tranche ID Quintile to align with LoRE / CoRE quintile values ranging from 1-5 in each category to align with RAMP 2025 filing. Added Service Territory Risk Reduction % column that represents the risk reduction on the feeder segment as a part of the overall territory risk as discussed on May 15 between OEIS and SDG&E Changed mitigation effectiveness estimate assumption in cell K11 from 1% to 4.95% to align with RAMP 2025 filing.
29	Substantive	Appendix G Excel file; Updated tab [Veg_Detail_Inspections] in columns to the right of the Risk Reduction % column Changed mitigation effectiveness estimate assumption in cell K11 from 1% to 4.95%	Added pre- and post-mitigation LoRE (Likelihood of Risk Event) and CoRE (Consequence of Risk Event) values to show mitigation effectiveness and to align with RAMP 2025 filing requirements Update the Tranche ID Quintile to align with LoRE / CoRE quintile values ranging from 1-5 in each category to align with RAMP 2025 filing. Added Service Territory Risk Reduction % column that represents the risk reduction on the feeder segment as a part of the overall territory risk as discussed on May 15 between OEIS and SDG&E

Item	Substantive or Non-substantive	Location of Issue in the 2026-2028 WMP	Description/Reason for Correction
			Changed mitigation effectiveness estimate assumption in cell K11 from 1% to 4.95% to align with RAMP 2025 filing.

Attachment A

Redlines of SDG&E's 2026-2028 Base WMP Substantive and Non-substantive Errata

1 EXECUTIVE SUMMARY

In January 2025, a 3-week weather event brought a rare combination of extreme Santa Ana winds, with gusts exceeding 100 miles per hour, critically low humidity levels, and a historic lack of rain in the Southern California region. San Diego County experienced the driest start to the rainy season in the past 174 years. In response to these threatening wildfire-weather conditions, San Diego Gas & Electric Company (SDG&E or Company) activated its Emergency Operations Center, where it utilized 2232 of the nation's most sophisticated weather monitoring stations to continuously track wind speeds and wildfire conditions, helping to make informed decisions about communities at risk. Wind speeds in the county reached record highs, exceeding 62 wind-gust records across the territory. Public Safety Power Shutoff (PSPS) de-energizations were implemented as a crucial last resort wildfire prevention measure in response to unprecedented weather conditions that led to prolonged high-fire risk. These measures were essential for safeguarding lives, property, and entire communities during times of extreme fire risk.

The Palisades and Eaton fires in Los Angeles County are a devastating reminder of the ongoing wildfire risk in Southern California. These fires, which started on January 7 during a fierce Santa Ana windstorm, burned over 37,000 acres, destroyed thousands of structures, and tragically caused the loss of at least 29 lives[1]. They have a significant impact on the local economy, with estimates of property damage alone ranging from $28 to $54 billion.[2] Recovery and rebuilding efforts will take many years, and in the meantime affected communities are experiencing hazardous fire debris and other health, safety, and economic challenges.

While the causes of these fires remain undetermined, these recent events are a reminder that there are real-life consequences and impacts to our communities when conducting wildfire risk identification, assessment, and modeling. While improvements in risk modeling to accurately represent and quantify the risk are critical, SDG&E does not underestimate the real-life implications of delaying sustained mitigations while trying to perfect risk models.

SDG&E remains a leader in wildfire risk assessment and modeling. SDG&E's models have been scrutinized by stakeholders through multiple proceedings at the California Public Utilities Commission (CPUC), including the Risk Assessment Mitigation Phase (RAMP) and General Rate Case (GRC), and over multiple years of Wildfire Mitigation Plans (WMPs)and WMP Updates. SDG&E has worked to incorporate stakeholder feedback, where reasonable and feasible, and the risk modeling dialogue facilitated in part by Energy Safety has assisted in the continual enhancement of SDG&E's understanding of wildfire and PSPS risk in its service territory. SDG&E's successful track record over the past 16 years of avoiding a utility-related catastrophic wildfire in its service territory, despite being located in an area with some of the highest wildfire risk in the nation, is in part due to the Company's ongoing efforts to target and effectively mitigate risk through data-driven and risk-informed programs tailored to the location.

[1] What we know about the victims killed in the California wildfires. 2025. NBC News. Updated February 12, 2025. https://www.nbcnews.com/news/us-news/california-wildfires-what-we-know-victims-killed-rcna188240

[2] Los Angeles wildfires caused billions of dollars in damage, economic impact will be felt for years, study finds. 2025. ABC7 Los Angeles. https://abc7.com/post/los-angeles-wildfires-caused-billions-dollars-damage-economic-impact-will-felt-years-study-finds/15960716/

In 2022 WiNGS-Ops underwent an internal review to determine areas of improvement. The model was updated to align with software development best practices by integrating source control, code optimization, and a multi-stage production environment.

By the end of 2024, this commitment to continuous improvement in risk analytics has further evolved. The WiNGS-Ops model now incorporates advanced machine learning algorithms and real-time data integration, significantly improving the accuracy and reliability of wildfire and PSPS risk assessments during periods of concern.

SDGE Table 5-8 and SDGE Table 5-9 show findings and recommendations for WiNGS-Planning and WiNGS-Ops that will be implemented in the 2026-2028 WMP cycle~~are in the process of being assessed, prioritized, and road mapped~~. For a complete summary of third-party recommendations, refer to ACI SDGE-25U-03 in Appendix D. In addition, SDG&E began a third-party study in 2025 that will document further findings and recommendations.

SDGE Table 5-8: WiNGS-Planning Third Party Recommendations

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
R1.1	Data Ownership	Ensure that there is an integrated function, such that communication from specific data owners is cohesive and timely. This would ensure the communication of definitions, use, bounds for validity, and decisions on changes. Data owners would also be responsible for ensuring that the data is up to date and accessible.	Severity Level: Medium – lack of communication from data owners may result in unexpected changes and diminished data integrity. The data owner is accountable for the use, quality and protection of a dataset.	2027	In progress
R1.2	Calculation Ownership	Assign owners of specific constants (e.g., PSPS risks) and calculation methodologies such that their definitions and approaches are agreed, documented and uniform across the business. This is to ensure that any colloquial terms used for aggregated data assets are consistent such that an output like “miles of span in HFTD in one group’s calculation is the same as another’s.	Severity Level: Low – a calculation owner will be accountable for ensuring calculation methodologies are clearly defined and are used appropriately and consistently.	2027	In progress
R2.1	Model Value	In order to quantify the value the model brings to the business, define a measurable metric that clearly shows what benefit the model is providing in order to evaluate if the value offsets the costs. A potential metric could be tracking the percent Electric System Hardening (ESH) deviates from the model recommendations.	Severity Level: Low – while not directly affecting the model output, it is best practice to regularly evaluate the value a model brings to a business to determine future growth and investment.	2027	In progress
R2.2	Initiation Stage Documentation	Document the initiation stage in order to capture critical elements of the initial planning stage. This	Severity Level: Medium – due to the lack of documentation from the	2026	In progress

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
		includes defining what problem this model will solve, what is the feasibility of the model, who are the end users and how do they want to ingest the model outputs, who are the subject matter experts and what is their ability to participate in the model development, who will be the business owner of the model, what are the initial assumptions and how were they determined, and confirmation that all relevant business areas have taken full sponsorship of the project. Additional details on why certain decisions were made with respect to model generation are also critical to document in the initiation process.	initiation of the WiNGS-Planning model, there are several assumptions and decisions that were made that cannot be explained now that the original stakeholders are no longer with the company.		
R3.1	Data Documentation and Dictionaries	Document for all input data, which should include the data owner, the context of the data, data collection methodology, structure and organization of the data, data validation and quality assurance steps, data manipulations from raw data, and data confidentiality, access and use conditions. If applicable, it should also include any calculations used to derive any of the fields, data dictionary of input data into those calculations, assumptions, references to methodologies or assumptions, and any limitations of the data. This will ensure a detailed understanding of the data that can be referenced as needed. Additionally, develop data dictionaries for all input data, which should list all the data fields. Each data field listing should include a description, data type, acceptable numerical ranges or classification values if applicable, units, if mandatory, null or missing value definition, effective date, and update information (including date of update, by who, what was updated, and why). This will ensure a thorough understanding of each data field, as well as a reference for data validation steps.	Severity Level: Low – not having documentation or data dictionaries do not prevent the model from running, however, there is a risk of misunderstanding the data, or if there is turnover on the data science team, new team members will have a more challenging time referencing and understand the data inputs.	2026	In progress
R3.2	Data Input Validation	Implement an automated data validation check for every data input to look for outliers, errors, text control, contradictions, etc. Each of	Severity Level: Medium – there is currently a lot of reliance on source data owners to validate their	2026	In progress

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
		these validation checks should have associated documentation that includes what to do when data is missing or anomalous. Examples of how outliers, errors, contradictions, etc. are detected and how corrections are performed in a demonstratable way should be provided if necessary.	data, which can lead to errors and reduce data quality.		
R3.4	LiDAR Tree Data	Update tree locations based on available LiDAR data to present a more accurate count of strikes per mile input for the circuit segments.	Severity Level: Medium – updating tree locations will likely change the tree strike potentials for circuit segments.	2027	Not Started
R4.2	Derived Data Validation	In line with recommendation R3.2, incorporate data validation steps when new fields are derived to ensure the generated data is explainable, and include documentation that explains the validation steps taken and what to do when data is missing or anomalous. Provide examples of how flagged data is detected and how corrections are performed in a demonstratable way if necessary.	Severity Level: Medium – validating derived data is an important step for ensuring the most accurate model outputs. Some values are valid on their own which allows them to make it through the initial data ingest validation step, but when put in context with another value, it may indicate the data is an outlier.	2026	In progress
R4.4	Mean Value Assessment	Conduct a detailed assessment of the instances where mean values are utilized in the calculations in order to determine if the approach would correctly account for outliers, potentially presenting a less risky situation than is accurate.	Severity Level: Medium – if it is determined that using mean values does not correctly account for outliers and a decision to use something other than mean values is made, then the data will change, which will result in a change to the risk score.	2027	In progress
R5.1	Stakeholder Involved Sensitivity Analysis	Conduct a more robust sensitivity analysis at a regular cadence (as outlined in ASTM E 1355 Section 10). Business stakeholders should be made aware of this sensitivity analysis and should be invited to participate in choosing the variables and their value ranges. The business users should then be involved in all output reviews and have the suggested changes/remediation actions presented to them, such that the impacts may be fully understood and agreed with.	Severity Level: Medium – a sensitivity analysis will provide the end users a better understanding of how different values affect the model as well as help identify which values are influencing the model the most. This will allow the end users to make more informed decisions when determining if they need to deviate from the model results.	2028	In progress

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
R5.2	Customer Type Multiplier Sensitivity Analysis	Perform a sensitivity analysis on the results of the customer type weight multipliers to evaluate if any unintended bias has resulted by adding weights to certain types of customers. This could include understanding the distribution of medical baseline and urgent customers relative to certain areas that may result in a decreased hardening priority.	Severity Level: Medium – if the results of the study indicate that the different customer type multipliers have the potential to adversely impact certain communities or demographics and the multiplier values are adjusted, that will result in changes to the CoRE model outputs and may change the mitigation rank for certain segments.	2028	Not Started~~In progress~~
R5.3	Formalize Model Validation Process	Devise and document formal process for validating the overall model outputs. This can be completed by comparing the run's results with previous iterations' outputs as well as identifying outputs that appear erroneous. It is also recommended to engage the end users to incorporate any additional thoughts or checks they have into the validation process.	Severity Level: Low – a formalized model validation process will instill greater trust by end users by knowing how the model results are validated prior to receiving the outputs and can reference any generated validation reports.	2027	In progress
R5.4	Formalize External Feedback Management Process	Create formalized demand management process for external parties to provide feedback and request adjustments to the models. This will ensure that as the team, model, and user base continue to grow, there is a robust mechanism through which updates may be requested, tracked, and implemented in the Cloud environment.	Severity Level: Low – this will not directly affect the model outputs; however, this is an important validation step between model developers and end users to continue to facilitate model development, accuracy, and value to the business.	2026	In progress
R6.1	Standardize Model Notifications	Create a standardized approach for how model update notifications are delivered and work with end users to capture the correct granularity and details that they would need to understand the changes.	Severity Level: Low – this recommendation will not have any effect on the model output but ensures that the appropriate level of communication is delivered between the development team and the end users.	2028	In progress
R6.3	Profiler	Run a profiler to identify any unused code that is taking up unnecessary technical debt.	Severity Level: Low – this recommendation does not affect the model output but may improve the runtime performance of the model.	2028	In progress
R6.4	Unit Testing	Incorporate unit testing to ensure all functions are performing as expected.	Severity Level: Low – this recommendation will only affect the model if any functions are not performing as they should.	2026	In progress ~~Completed~~

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
R7.1	End User Data Consumption	Work with end user to see how they would like to consume the data, then develop and implement a standard way of delivering data.	Severity Level: Low – this recommendation has no effect on the model output results, but it is important to establish the most efficient way to deliver the output results to the end users.	2028	In progress
R7.2	AWS~~ws~~ Billing Limits	Introduce billing limits for certain sandbox/development activities such that there is not a risk of an unintended spike in cloud costs for a development error.	Severity Level: Low – this recommendation is to ensure that model costs are monitored and meet the set budget.	2026	In progress
R7.3	AWA Access Control	Review access control principles, focused on two areas, review the default access periods so access is revoked if someone doesn't access for a given period of time and consider enabling row or column-level security to ensure users only access certain subsets of data most relevant and appropriate to them, which will become more necessary in the WiNGS-Planning visualization tool.	Severity Level: Low – following the security pillar from the 6 pillars of the AWS Well-Architected Framework will ensure the confidentiality and integrity of the data and prevent unauthorized access and changes to the model and systems.	2028 ~~2026~~	Not Started ~~In progress~~
R7.4	Single Cloud Vendor Consolidation	In the future, consolidate services under one cloud provider for ease of use, integration, and billing. This can ensure that future updates to any of the cloud services are always made in a way to keep compatibility and seamless integration with the other developed components.	Severity Level: Low – this recommendation has no impact on the output of the WiNGS-Planning model but would allow for greater efficiency in use of cloud services.	2028 ~~2026~~	Not Started
R7.5	AWS Athena Consolidation	With improved Governance of the data, create only one instance of AWS Athena, with the GIS and Flat File data combined into the Data Mesh layer. With the data available in the Data Mesh, appropriate ownership and controls must be established such that any shared data is used within the bounds of its intended purpose.	Severity Level: Low – reducing from multiple instances of AWS Athena down to one would ensure efficiency of use and a lower overhead to manage, monitor, and maintain.	2028 ~~2026~~	In progress
R7.7	Separate Access On AWS	Create separation in the access to Cloud workspaces as the products mature.	Severity Level: Low – this would allow more control over access control, budget planning, and spend tracking for the separate groups.	2028 ~~2026~~	Not Started ~~In progress~~

SDGE Table 5-9: WiNGS-Ops Third-Party Recommendations~~Risk Modeling Updates~~

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
R1.5 ~~1~~	Data Owner Communication	Ensure that there is an integrated function, such that communication from specific data owners is cohesive and timely. Definitions, use, bounds for validity, and decisions on potential changes would be communicated. Data owners would also ensure that data is up to date and accessible.	Severity Level: Medium – lack of communication from data owners may result in unexpected changes and diminished data integrity.	2026	In Progress
R1.6 ~~2~~	Calculation Ownership	Assign owners of specific constants (e.g., PSPS risks) and calculation methodologies such that their definitions and approaches are agreed, documented and uniform across the business. This is to ensure that any colloquial terms used for aggregated data assets are consistent such that an output like "miles of span in HFTD in one group's calculation is the same as another's.	Severity Level: Low – a calculation owner will be accountable for ensuring calculation methodologies are clearly defined and are used appropriately and consistently.	2026	In progress
R1.7 3	Model Ownership	Implement broader model ownership in the form of a board/ group with regular meeting cadence to agree to higher-level changes and adjustments, reviewing output of sensitivity analysis and changes prior to implementation. This would ensure that the direction of overall model enhancements and improvements is agreed amongst the Developers, Wildfire Mitigation team, and the Business users.	Severity Level: Low – without regular communication between all stakeholders, the direction and prioritization of model development and improvements can be missed.	2027	In Progress
R1.9	External Inference Team	Integrate more SDG&E resources into the inference team so that knowledge and experience is internalized and reliance on external contractors is reduced. Currently, the development team responsible for the inference aspects of WiNGS-Ops are a group of external contractors. The team is effective in the conversion of models from training and test phase to inference phase but do not look	Severity Level: Low – as the WiNGS-Ops model continues to mature and gain complexity, the technical debt on external development members of the Advanced Analytics team will grow, increasing this reliance.	2028	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		to challenge the training team to improve the models.			
~~4~~	~~EAMP Data Experts~~	~~Onboard an internal team to share subject matter expertise responsibility for EAMP/Asset 360. EAMP/Asset 360 provides a rich asset data source used in modeling. The data itself is a clean and curated version of GIS and Asset Management data. Currently, the program is operated by external contractors who also remain as the data source subject matter experts. The source, including all dictionaries and implemented manipulations, should also be fully documented such that any new user may easily gain a complete understanding of the data and its use.~~	~~Severity Level: Medium – with a continued reliance on external parties for this critical data source, the team will not gain full ownership, understanding, and control over the underlying data. Internal subject matter expertise in the data source will ensure a robust and future-proof mechanism for data understanding, questions, and data updates.~~	~~2025~~	~~Complete~~
R2.15	OIR Requirements	Build and maintain a formalized report that tracks OIR requirements and how they were carried out in order to ensure that all Order Instituting Rulemaking (OIR) requirements are met and prevent possible violations. Having this existing documentation will not only confirm what the requirements are and if and how they were completed but will also be ready to pass along to the OIR as appropriate.	Severity Level: Low – this will help prevent potential violations from the OIR by tracking all the requirements and how they were completed.	~~2026~~ 2028	In Progress
R2.2 ~~6~~	Model Change Documentation	Create a formal process through which requirements for model changes are captured, tracked, and completed against. This will ensure that changes are understood and captured correctly and will allow success criteria to be defined and assessed against by the end users in their approval of model changes.	Severity Level: Low – without a documented process, requirements and requested changes may be incorrectly implemented or the end users may not have an easy mechanism for change approval.	2026	In Progress
R2.4 ~~7~~	Initiation Stage Documentation	Document the initiation stage in order to capture critical elements of the initial planning stage. This includes defining what problem this model will solve, what is the feasibility of the model, who are the end users and how do they	Severity Level: Low – without this documentation in place, future developers and end users may have a more difficult time understanding the decisions and assumptions that were made, which subject	2026	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		want to ingest the model outputs, who are the subject matter experts and what is their ability to participate in the model development, who will be the business owner of the model, what are the initial assumptions and how were they determined, and confirmation that all relevant business areas have taken full sponsorship of the project. Additional details on why certain decisions were made with respect to model generation are also critical to document in the initiation process.	matter experts to turn to for input, how the model will be measured for success, or the original problem and objectives.		
R3.1 ~~8~~	Data Input Validation	Implement an automated data validation check for every data input to look for outliers, errors, text control, contradictions, etc. Each of these validation checks should have associated documentation that includes what to do when data is missing or anomalous. This should be implemented in the inference pipeline and should be consistent with data validation performed by the WiNGS-Ops data science team during their exploratory data analysis process.	Severity Level: Medium – there is currently a lot of reliance on source data owners to validate their data, which can lead to errors and reduce data quality.	2026	In Progress
R3.2	Pole and Span Imputation	In collaboration with the GIS team, develop a logic-based solution for imputing pole location information using other fields when historical pole locations are missing. This may include utilizing an existing GIS redlining process for resolving these gaps.	Severity Level: Low – this would ensure that the data used in modeling is most representative of the network. It may also help reduce the number of minority class records that are dropped due to missing data.	2028	In Progress
R3.4	Data Object Governance	Increase governance and controls for each of the data objects utilized by WiNGS-Ops such that none of the data created for and used in the models is inadvertently used for a different purpose, generating alternative and incorrect views of the landscape.	Severity Level: Low – although this may not directly impact the output of the WiNGS-Ops model, it may affect the credibility of the data sources used if the source is used incorrectly elsewhere.	2026	In Progress
R3.5 ~~9~~	SAIDIDAT Data Ingestion	Perform a direct query of SAIDIDAT data from its source database. This eliminates the	Severity Level: Low – manual data request and transfers are reliant on the requestor to ask for the information.	2026	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		reliance on individuals and prevents potential human error.	Automating the request process may be a better way to obtain updated outage history data on a scheduled basis rather than on an as-requested basis.		
R4.1	Feature Removal	For the models that do not have auto regularization, remove the less relevant features as measured by the feature importance function outputs. Removing less relevant features will help with the stability of the model, avoid overfitting, and reduce computation cost.	Severity Level: Medium – it is unclear at this stage the impact that inclusion of these unimportant features has on the outputs. Removing them has the potential to skew results which may have a large impact, so has been rated as such.	2026	In Progress
R4.2 ~~10~~	Alternative Land Use Data Source	Work closely with the SANGIS team to incorporate service territory areas currently not covered in their existing coverage data, as well as request more frequent than annual data updates. This would ensure the models have access to the same information as the rest of San Diego County and are up to date during a red flag warning event.	Severity Level: Low – models run on data which has not been recently refreshed or on imputed data based on mean values may provide inaccurate outputs. This may cause a model to under-represent the potential consequence of an ignition due to a missing at-risk land use.	2028 ~~2026~~	Not Started
R4.3 ~~11~~	Model Improvement Limitations	Do not develop or incorporate additional features to the models. Due to the time pressures and resource constraints, the team does not have the capacity to further improve models in this manner.	Severity Level: Low – impact would be minimal due to the models' existing satisfactory performance but might represent a missed opportunity for continued model improvements and enhancement.	2028 ~~2026~~	In Progress
R4.4	Safety Weights Documentation	Create a documented framework to define the safety weights used in the PSPS model such that there is an explainable process through which they may be assessed and updated based on additional subject matter expertise. These weights must also be integrated into version control, so that changes are managed and easily tracked, model version to model version. This documentation would help future model developers and users better understand why certain values were used and what the historical justifications and rationale were.	Severity Level: Low – without a clearly documented process for suggesting changes to the weights and version control to track those changes, it may be difficult to provide explanatory evidence in support of decisions driven by this model.	2026	Not Started

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
R5.1 ~~12~~	Class Imbalance Approaches	Test other approaches to handling class imbalanced data, including up-sampling, SMOTE, and ADASYN, in order to determine the most applicable method for each model.	Severity Level: Medium – down-sampling excludes significant amounts of data which may result in an unrepresentative data sample being used for training and testing the model.	2026	In Progress
R5.2 ~~13~~	Algorithm Testing	Test other algorithms to ensure that the most suitable algorithm is used to solve the problem, balancing complexity of understanding and training with accuracy of modeling outputs.	Severity Level: Low – without validating that there isn't a more suitable algorithm for the model, the team cannot be certain that they have built the most suitable model for the specific application.	2028 ~~2026~~	In Progress
R5.3	Collaborative Model Development and Release	Implement a more collaborative approach towards model development and release. A peer-reviewed approval process (similar to the one used by WiNGS-Planning) can ensure consistency between sub-models and that best practices are followed.	Severity Level: Medium – individual working may lead to inconsistencies between models, resulting in deployment of models with differing levels of robustness.	2026	In Progress
R5.4 ~~14~~	Conductor Model Retrain	Retrain the conductor model based on data from 2015 to present, utilizing the 2022 data for testing and validation. This will ensure the most representative data is utilized in construction and training to create the most accurate and useful modeling outputs.	Severity Level: Medium – based on the most recent data used for validation, the model under-represented the potential risk due to conductor failure. Re-training this model would generate a more representative output.	2026	In Progress
R5.5 ~~15~~	Same Data Sources	Train the models on the same data sources that would be utilized for inference in production such that the resulting outputs are most relevant and applicable.	Severity Level: Medium – as the models were trained on different source data, the learned data relationships may not be representative of what would be seen in the EOC. As a result, outputs of the models may not be as accurate as if the data used for training was the same source as used in inference.	2027 ~~2026~~	Not Started ~~In Progress~~
R5.6 ~~16~~	GIS Cleaning	Consider a larger program of GIS data cleaning, validating, and improvement and investigate if existing GIS red lining processes can be leveraged to ensure the GIS system of record for assets represents the most accurate view of assets in the service territory. This would ensure that any modeling application or	Severity Level: Low – it is critical that decisions in the EOC are made based upon the most accurate representation of the assets in the field.	2028 ~~2027~~	Not Started

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		activation event would consider that most accurate understanding when making data-driven decisions.			
R5.7 ~~17~~	Hyper-parameter Tuning	Implement the approach used for tuning hyper-parameters in the foreign object model, GridSearchCV, for tuning hyper-parameters in the vehicle contact model.	Severity Level: Low – consistent use of techniques across models ensures that the quality and robustness of each model is uniform and contributes to an optimal output.	2026	Not Started
R6.1 ~~18~~	Brier Score	Use the full Brier score such that the outputs are unaffected by population size. This will enable Brier scores to be compared across different versions of a model to allow model improvements to be validated.	Severity Level: Low – a modified Brier score might be inadvertently used to compare models with different sample sizes. This would give an inaccurate view of the performance comparison and could result in an incorrect modeling decision.	2027	Not Started
R6.2 ~~19~~	Class Imbalance Validation Methodology	For the vehicle contact model, incorporate a nested cross validation where one fold is an out-of-period imbalanced data split for the final validation and the other fold is split for training and testing on balanced sampled data set. This would provide an additional method for validating the accuracy of the model. Ensure the right metric is used for the evaluation, as some metrics are better for evaluation when there is class balance (ROC AUC) and others are better for when there is class imbalance (Precision-Recall AUC).	Severity Level: Medium – validating imbalanced data with this approach checks performance of the model against real class distribution.	2027	Not Started
R6.3 ~~20~~	Uniform Model Testing	Establish a consistent and agreed approach for model testing across the team such that each member may be sure of the optimal model and be in agreement when training is complete. This will ensure consistency across models and build credibility with the end users.	Severity Level: Low – models may have differing levels of robustness without a uniform, defined, and agreed upon approach to testing.	2026	In Progress
R6.4 ~~21~~	Data Documentation	Provide detailed documentation for all data that is ingested into the models The documentation is the responsibility of the data owners and should contain pertinent information such as the	Severity Level: Low – without detailed documentation, there is a risk the data can be misinterpreted, or if there is turnover or new hires on the WiNGS-Ops Data Science or	2026	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		data owner, data collection methodology, data dictionary, structure of the data, data validation and quality assurance steps taken, data manipulations from the raw data, and confidentiality, access and use conditions. This will ensure a detailed understanding of the data that can be reference as needed, critical for ground truth data.	Advanced Analytics teams, they may have a more challenging time referencing and understanding the data inputs.		
R7.1 ~~22~~	Back-casting Model Validation Process	Create a more holistic and reliable model validation process to allow automated back-casting for each model change. This would allow for greater confidence in the updated version of each model. Given the snapshots of data are now maintained in the cloud, this ensures that this process would be simpler to perform.	Severity Level: Low – without an automated and uniform approach to model output validation, validating each new model release will be a time-consuming and inconsistent process.	2026	In Progress
R7.2 ~~23~~	Back-casting Data Capture	Ensure that all necessary data and calculation components are captured, including the network configuration, at the time of a PSPS activation to help streamline future back-casting exercises.	Severity Level: Low – implementing this would allow for the automated and uniform approach mentioned in R7.1 and could be enacted for model back-casting.	2028 ~~2027~~	In Progress
R7.3 ~~24~~	End User Formalized Validation Process	Establish a formalized validation process by the end users that will establish consistency in the validation approach and also build credibility with OEIS by demonstrating the results are reviewed in a specific and systematic way.	Severity Level: Low – without a formalized validation process, there is the potential for end users to validate the model differently every time a new model version is released. This may result in missing an important check or reviewing an output that differs from a previous model version.	2026	In Progress
R8.1 ~~25~~	Centralize Models	Migrate the conductor training model and PSPS model scripts to Azure DevOps Repos. This will ensure development on local machines are version controlled, tracked appropriately, and accessible by the team. This will also allow models to leverage cloud compute capabilities, meaning that more advanced models may be produced. Additionally, the PSPS model should be passed to the inference	Severity Level: Medium – current processes limiting version control and access could introduce errors and confusion in the correct version that should be run in production. Full cloud migration would limit the risk of this issue.	2027	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		team such that the entire WiNGS-Ops model can be executed through the inference pipeline.			
R8.4 ~~26~~	Profiler	Run a profiler to help understand the resource consumption of the various operations in the model. This can potentially resolve performance bottlenecks and help the model execute faster.	Severity Level: Low – this recommendation does not affect the model output but may improve the runtime performance of the model.	2027	In Progress
R8.5 ~~27~~	Unit Testing	Incorporate unit testing to ensure all functions are performing as intended and errors are more easily isolated when they occur. Unit tests also check that the code still functions as expected after making changes, which builds code stability.	Severity Level: Medium – Without unit testing, there is no assurance that the code will function correctly and that there are no undiscovered bugs. This can lead to poor quality modeling results and wasted time and resources spent debugging.	2027	In Progress
R8.7 ~~28~~	Docstrings	Ensure all python functions have docstrings, which will ensure that all functions are correctly documented and definitions, descriptions, and decision point reasoning are captured. Docstring best practice for a function includes a brief description of what the function is and what it is used for, any arguments that are passed, labeling what is required and what is optional, and determining any restrictions on when the function can be called or any exceptions that are raised.	Severity Level: Low – this recommendation will not affect the model outputs but is a best practice to follow when writing code.	2028 ~~2027~~	In Progress
R9.1 ~~29~~	Internal Resources Embedded into Each Team	Ensure there is a skilled and knowledgeable base of internal resources involved in each aspect of the WiNGS-Ops modeling process such that reliance on external parties is reduced.	Severity Level: Low – the Advanced Analytics team is skilled and knowledgeable so there is minimal risk to the model outputs at this stage.	2027	In Progress
R9.2 ~~30~~	Cloud Consolidation	Consolidate services under one cloud provider for ease of use, integration, and billing. This can ensure that future updates to any of the cloud services are always made in a way to keep compatibility and seamless integration with the other developed components.	Severity Level: Low – this recommendation has no impact on the output of the WiNGS-Ops model but would allow for greater efficiency in use of cloud services. Although cloud services may work together across different vendors, they are optimized to work most effectively when combined with services belonging to one single cloud provider.	2028 ~~2027~~	Not Started

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
R9.3 ~~31~~	Pipeline Deployment Documentation	Create robust and granular documentation of the deployment pipeline, which would ensure a lower reliance on the experience of resources.	Severity Level: Medium – without this documentation, a continued reliance on external resources would be mandatory as there would be no straightforward mechanism through which internal resources could inform themselves on the finer details of the inference pipeline.	2027	In Progress
R9.4	Modeling Key Drivers	Expose key drivers of the modeling output to the users, such that they may gain a greater understanding of the outputs and some indication on how an output should be viewed and utilized.	Severity Level: Low – this detail may allow for greater understanding and trust in the WiNGS-Ops output.	2026	In Progress
R9.5 ~~32~~	Limitations Documentations	Document the limitations of the models that underpin the WiNGS-Ops outputs and ensure that these are fully understood by the business users. This will ensure that any decisions made based on the result of the WiNGS-Ops model are made from the most informed position.	Severity Level: Medium – without understanding the limitations of the model, sub-optimal decisions may be made due to a misinterpretation of the results.	2026	In Progress
R9.6 ~~33~~	Full Model Lifecycle Documentation	Document the full lifecycle of each model in training and in inference such that the knowledge, skills and experience of the team is captured for future use. This would also enable training and onboarding of new resources to be more straightforward and regulatory filings to be completed more swiftly. Example pieces to include in this documentation are the problem formulation process, all decision points and reasonings, and future plans and intentions.	Severity Level: Low – the team is knowledgeable in the models they have constructed so any risk is reduced. In most cases there is only one team member with discrete knowledge of the specific model.	2027	In Progress
R9.7 ~~34~~	Weather Sanitization Ownership Update	Update the technical ownership of the weather sanitization repository and any other repositories that may have changed ownership.	Severity Level: Medium – the script is well understood by multiple parties, however there is no single owner to drive decisions or improvements.	2026	In Progress
R9.8	Weather Station Imputation Mapping	On the inference side, implement the device to weather station associations that the Meteorology team determined based on topographical features into the weather station	Severity Level: Medium – there is the potential to produce skewed results if there is a significant topographical impact on certain spans.	2026	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		mapping. This will ensure the most suitable weather station data is used for each segment.			
R9.9 ~~35~~	Missing Data Outputs	Correct data issues such that all segments have an outputted value from the WiNGS-Ops model. Failing that, provide full communication and explanation to the end users for those segments where a WiNGS-Ops output was unable to be generated. This would ensure that awareness of these missing values is gained and decisions are not based on the omission of those segments in the model outputs.	Severity Level: Medium – while the PSPS de-energization decision takes other inputs aside from WiNGS-Ops, without a complete model output for every segment, it is conceivable that the decision maker will lose trust with WiNGS-Ops model if a PSPS de-energization decision would need to be made for a segment that has no WiNGS-Ops output.	2026	In Progress
R9.10 ~~36~~	Cold Storage	Consider the use of cold storage for long-term storage of snapshots or model runs which do not need to be accessed regularly. This would reduce the overall costs of the cloud infrastructure, which will become more important as the models and data sets mature and grow in size.	Severity Level: Low – as the size of files being stored currently is not large, use of cold storage would have a minimal effect on the cost of cloud services, though remains a best practice recommendation.	2028 ~~2027~~	Not Started
R9.11 ~~37~~	Error Monitoring Dashboard	Develop a monitoring dashboard that provides real-time error monitoring and a view of the model runs such that issues may be highlighted and resolved in a timely manner.	Severity Level: Low – existing monitoring allow for errors to be identified; however, advanced monitoring would allow a more streamlined process for error identification and remediation.	2026	In Progress
R9.12 ~~38~~	Global ID Cleaning	Clean the data such that all Global IDs are valid and the amount of feeders without output results due to invalid global IDs decreases. This will prevent situations where the WiNGS-Ops model is unable to produce risk scores.	Severity Level: Medium – having up to 10% of feeders without risk scores could cause a loss of credibility within the organization when the model is needed to provide data driven insights for PSPS de-energization decision making.	2026	In Progress
R10.1 ~~39~~	Issue Reporting Process	Create a formalized process for issue reporting from the end users to the development teams. This should be simple and streamlined such that any issues may be raised, quantified, and remediated quickly.	Severity Level: Low – currently there is no prescribed process, which could lead to confusion as to the point of escalation for issues. This may result in a delay to any remediation activity and impact the quality of outputs.	2026	In Progress
R10.2 ~~40~~	Action & Tasks Log	Document meetings and create a backlog for actions/tasks so they	Severity Level: Low – without a formalized process of	2027	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		can be prioritized, tracked, and completed against. This will ensure that all tasks are captured and implemented as intended and miscommunication is avoided.	documentation and action tracking, there may be more instances of misunderstanding of intention between teams, which might result in a sub-optimal outcome or re-work in remediating the concern.		
R10.3 ~~41~~	Questions and Model Changes Tracking	Create a formalized process for questions and model changes ahead of each activation event. In addition, track changes to model code and outputs through formal version control. This will mean that the decision points and actions taken are formally documented and easily explainable if a reference is required, which may aid answering regulatory questions or post-event report preparation.	Severity Level: Low – the current process will result in a more time-consuming post-activation event reporting process. This may mean a period of potential re-work to establish the reasoning behind certain tweaks and decisions taken in the model pre-event.	2027	In Progress
R10.4 ~~42~~	WiNGS-Ops Overall Versioning Process	Create an overall WiNGS-Ops model versioning process such that changes or updates to any component of WiNGS-Ops results in a version iteration. This ensures that users have a clear indication of when a model methodology has changed. This may help the users understand which models may be easily compared.	Severity Level: Low – the current versioning methodology may result in inaccurate comparisons being made by end users across models.	2027	In Progress

5.6.2 MODEL CONTROLS, DESIGN, AND REVIEW

5.6.2.1 MODULARIZATION

The WiNGS-Planning and WiNGS-Ops models utilize a modular approach to risk modeling, ensuring that each component of the wildfire risk assessment process is independently evaluated and optimized. This modularization allows for precise tracking and control of changes and enhancements over time, facilitating a more transparent and comprehensive review by subject matter experts such as Risk Analysts, Data Scientists, and Machine Learning-Ops engineers. By breaking down the complex interactions between models and sub-models into distinct modules, the propagation of small changes in assumptions or inputs can be more effectively managed and analyzed, improving the accuracy and reliability of the overall risk assessment. The code base for both models is maintained in a strict git code repository that is version controlled.

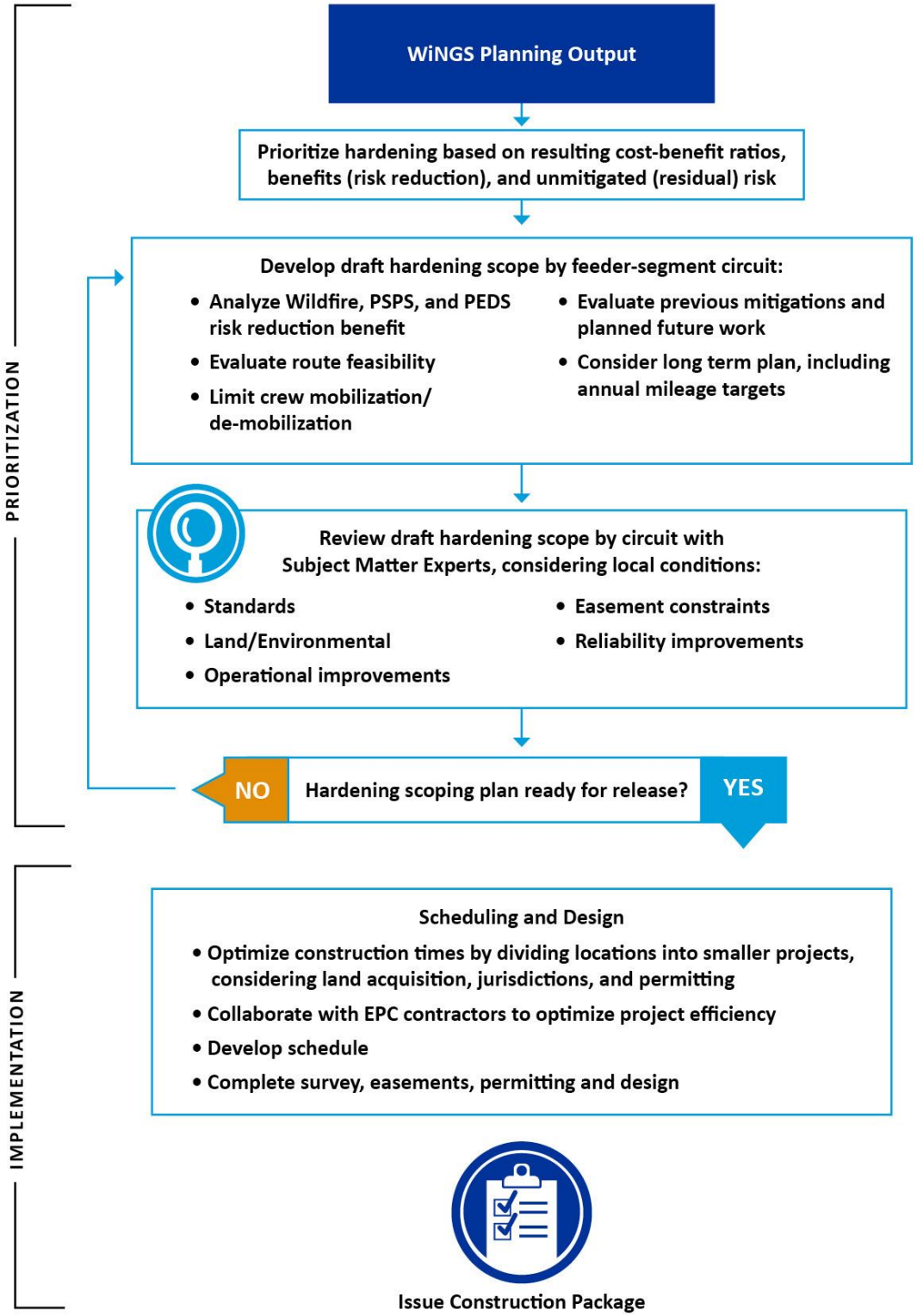
SDGE Table 6-1: Potential Mitigation Activities for Risk Drivers included in List of Prioritized Circuit Segments

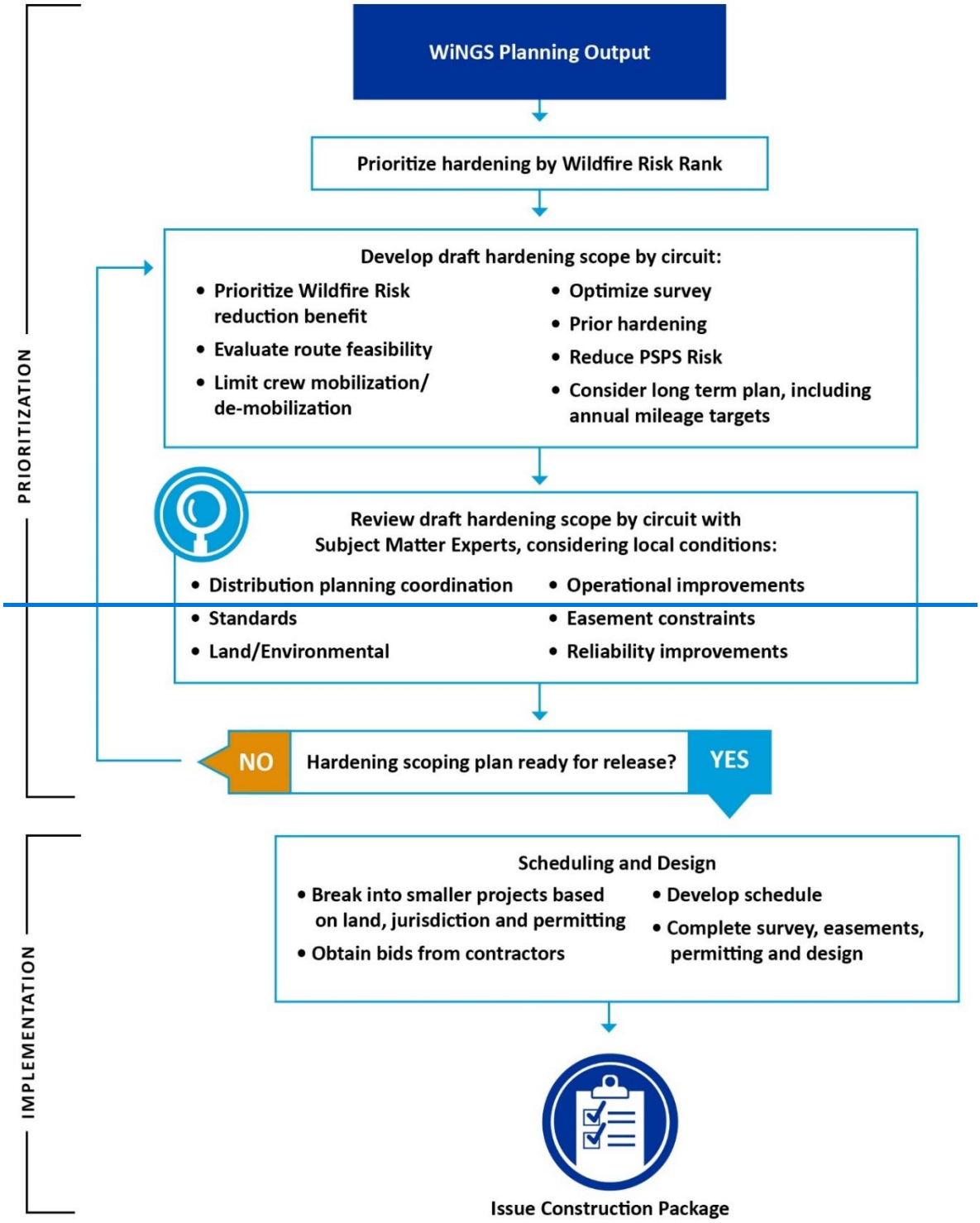
Risk Driver (from OEIS Table 6-1)	Initiative	Activity	Tracking ID	Activity Effectiveness	Expected Implementation Cost (K$)	CapEx	O&M	Uncertainties / Potential Impacts	Implementation Schedule
Contact from Object	Grid Design and System Hardening	Strategic Undergrounding	WMP.473	99%	$435,575.00	$430,561.00	$5,014.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Grid Design and System Hardening	Combined Covered Conductor	WMP.455	59%	$212,401.00	$208,317.00	$4,084.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Grid Design and System Hardening	Advance Protection	WMP.463	8%	$6,354.00	$5,793.00	$561.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Grid Design and System Hardening	Early Fault Detection	WMP.1195	16%	$7,613.00	$7,604.00	$9.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Public Safety Power Shutoff	PSPS	n/a	n/a	n/a**	n/a**	n/a**	See Section 6.1.3.1.4	2026-2028
Contact from Object	Grid Operations and Procedures	Sensitive Relay Profile	n/a	n/a	n/a***	n/a***	n/a***	See Section 6.1.3.1.4	2026-2028
Contact from Object	Asset Inspections	Distribution Overhead Detailed Inspections	WMP.478	29%	$3,004.00	$0.00	$3,004.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Asset Inspections	Distribution Wood Pole Intrusive Inspections	WMP.483	29%	$2,536.00	$0.00	$2,536.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Asset Inspections	Risk-Informed Done Inspections	WMP.522	29%	$104,208.00	$70,625.00	$33,583.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Asset Inspections	Distribution Overhead Patrol Inspections	WMP.488	29%	$852.00	$0.00	$852.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Asset Inspections	Transmission Overhead Detailed Inspections	WMP.479	28%	$3,425.00	$3,380.00	$45.00	See Section 6.1.3.1.4	2026-2028
Contact from Object	Asset Inspections	Transmission Infrared Inspections	WMP.482	28%	n/a*	n/a*	n/a*	See Section 6.1.3.1.4	2026-2028
Contact from Object	Asset Inspections	Transmission Wood Pole Intrusive Inspections	WMP.1190	28%	n/a*	n/a*	n/a*	See Section 6.1.3.1.4	2026-2028
Contact from Object	Asset Inspections	Transmission Overhead Patrol Inspections	WMP.489	28%	n/a*	n/a*	n/a*	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Grid Design and System Hardening	Strategic Undergrounding	WMP.473	99%	$435,575.00	$430,561.00	$5,014.00	See Section 6.1.3.1.4	2026-2028

Risk Driver (from OEIS Table 6-1)	Initiative	Activity	Tracking ID	Activity Effectiveness	Expected Implementation Cost (K$)	CapEx	O&M	Uncertainties / Potential Impacts	Implementation Schedule
Vegetation Contact	Grid Design and System Hardening	Combined Covered Conductor	WMP.455	59%	$212,401.00	$208,317.00	$4,084.00	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Vegetation Management and Inspections	Off-cycle patrol	WMP.508	4.951%	$4,399.00	$0.00	$4,399.00	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Vegetation Management and Inspections	Prune and Removal	WMP.501	4.951%	$91,017.00	$0.00	$91,017.00	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Vegetation Management and Inspections	Vegetation Detailed Inspections	WMP.494	4.95%	$14,038.00	$0.00	$14,038.00	See Section 6.1.3.1.5	2026-2029
Vegetation Contact	Public Safety Power Shutoff	PSPS	n/a	n/a	n/a**	n/a**	n/a**	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Grid Operations and Procedures	Sensitive Relay Profile	n/a	n/a	n/a***	n/a***	n/a***	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Asset Inspections	Distribution Overhead Detailed Inspections	WMP.478	29%	$3,004.00	$0.00	$3,004.00	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Asset Inspections	Distribution Wood Pole Intrusive Inspections	WMP.483	10%	$2,536.00	$0.00	$2,536.00	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Asset Inspections	Risk-Informed Done Inspections	WMP.552	29%	$104,208.00	$70,625.00	$33,583.00	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Asset Inspections	Distribution Overhead Patrol Inspections	WMP.488	10%	$852.00	$0.00	$852.00	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Asset Inspections	Transmission Overhead Detailed Inspections	WMP.479	28%	n/a*	n/a*	n/a*	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Asset Inspections	Transmission Infrared Inspections	WMP.482	28%	n/a*	n/a*	n/a*	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Asset Inspections	Transmission Wood Pole Intrusive Inspections	WMP.1190	28%	n/a*	n/a*	n/a*	See Section 6.1.3.1.4	2026-2028
Vegetation Contact	Asset Inspections	Transmission Overhead Patrol Inspections	WMP.489	28%	n/a*	n/a*	n/a*	See Section 6.1.3.1.4	2026-2028
Equipment / facility failure or damage	Grid Design and System Hardening	Strategic Undergrounding	WMP.473	99%	$435,575.00	$430,561.00	$5,014.00	See Section 6.1.3.1.4	2026-2028

6.1.3.2.6 Mitigation Initiative Prioritization to Reduce Wildfire and PSPS Risk

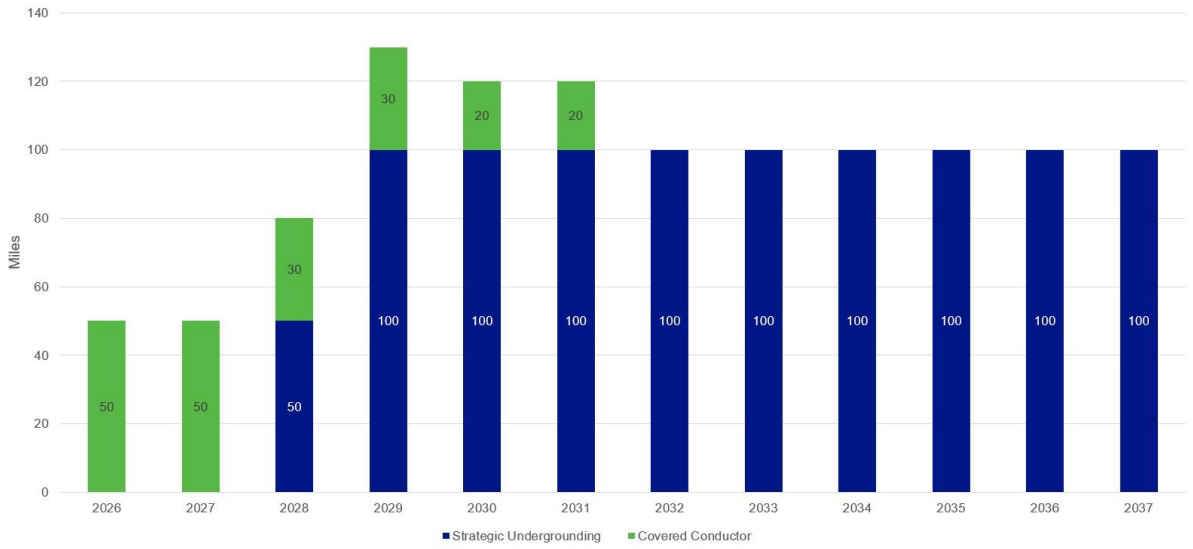
Figure 6-2: High-Level Mitigation Prioritization to Reduce Wildfire and PSPS Risk

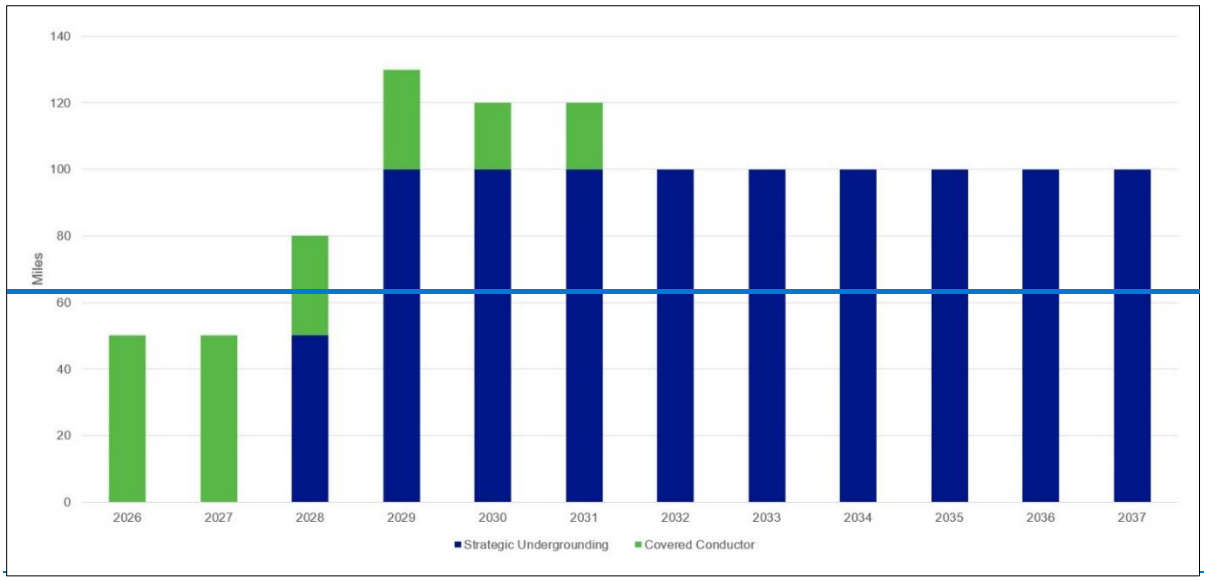




The WiNGS-Planning model makes one of three recommendations to mitigate risk for circuit-segments with overhead exposure in the HFTD: 1) strategic undergrounding of electric lines, 2) installation of

Figure 6-4: Wildfire Hardening Targets





Risk methodology will continue to be refined, and targets will continue to be revised to optimize the portfolio of undergrounding electric lines and installation of covered conductors. SDG&E is dedicated to working with industry partners, academic institutions, stakeholder groups, and other IOUs to continually improve its risk models to ensure the risk models accurately reflect the expected impacts of future climate change on wildfire risk. SDG&E will revise its current risk model methodology as new scientific data emerges and evaluations are performed.

OEIS Table 6-3: Risk Impact of Activities

Initiative Activity	Initiative Activity Section #	Activity Effectiveness – Overall Risk	Activity Effectiveness – Wildfire Risk	Activity Effectiveness-Outage Program Risk[a]	Cost-Benefit Score - Overall Risk	Cost-Benefit Score - Wildfire Risk	Cost-Benefit Score – Outage Program Risk[b]	% HFTD Covered	% HFTD/ HFRA Covered[c]	Expected % Risk Reduction	Model(s) Used to Calculate Risk Impact
Combined Covered Conductor (WMP.0455)	8.2.1	58%	58%	n/a[d]	1.551.52	4.491.52	n/a	3.85%	n/a	40.3334.66%	WiNGS-Planning v4.0
PSPS Sectionalizing Enhancements (WMP.461)[e]	8.2.11.1	n/a	n/a	n/a	n/a	n/a	n/a	100%	n/a	n/a	WiNGS-Planning v4.0
Microgrids (WMP.462)	8.2.7	100%[f]	0%	100%[f]	0	0[g]	0	0.18%	n/a	100%	WiNGS-Planning v4.0
Advanced Protection (WMP.463)	8.2.8.1	8%	8%	n/a	7.42	7.42	n/a	5.95%	n/a	1.86%	WiNGS-Planning v4.0
Strategic Undergrounding (WMP.473)	8.2.2	99%	99%	99%[h]	11.53 11.73	11.73	n/a	0.01%	n/a	98.38%	WiNGS-Planning v4.0
Distribution Overhead System Hardening (WMP.475)	8.2.5.1	39%	39%	n/a	2.36	2.36	n/a	0.36%	n/a	3.12%	WiNGS-Planning v4.0
Distribution Overhead Detailed Inspections (WMP.478)	8.3.1	29%	29%	n/a	52.72 106.80	106.80	n/a	100.00%	n/a	7.76%	WiNGS-Planning v4.0
Transmission Overhead Detailed Inspections (WMP.479)	8.3.2	28%	28%	n/a	n/a[i]	n/a[i]	n/a[i]	100%	n/a	n/a[i]	WiNGS-Planning v4.0
Detailed Inspections (WMP.494)	9.2.1	4.951%	4.951%	n/a	28.17 5.69	28.175.69	n/a	100.00%	n/a	4.820.97%	WiNGS-Planning v4.0
Fuels Management (WMP.497)	9.7	4.951%	4.951%	n/a	0.600.12	0.600.12	n/a	0.69%	n/a	0.160.03%	WiNGS-Planning v4.0
Off-Cycle Patrol (WMP.508)	9.2.2	4.951%	4.951%	n/a	65.16 13.16	65.1613.16	n/a	100.00%	n/a	4.820.97%	WiNGS-Planning v4.0

Initiative Activity	Initiative Activity Section #	Activity Effectiveness – Overall Risk	Activity Effectiveness – Wildfire Risk	Activity Effectiveness-Outage Program Risk[a]	Cost-Benefit Score - Overall Risk	Cost-Benefit Score - Wildfire Risk	Cost-Benefit Score – Outage Program Risk[b]	% HFTD Covered	% HFTD/ HFRA Covered[c]	Expected % Risk Reduction	Model(s) Used to Calculate Risk Impact
Pole Clearing (Brushing) (WMP.512)	9.4	4.951%	4.951%	n/a	15.093.05	3.05	n/a	30.43%	n/a	4.830.98%	WiNGS-Planning v4.0
Strategic Pole Replacement (WMP.1189)	8.2.3.2	39%	39%	n/a	4.40	4.40	n/a	0.83%	n/a	1.41%	WiNGS-Planning v4.0
Early Fault Detection (WMP.1195)	10.3.1	16%	16%	n/a	76.35	76.35	n/a	32.99%	n/a	15.56%	WiNGS-Planning v4.0
Distribution Overhead Patrol Inspections (WMP.488)	8.3.7	10%	10%	n/a	190.89 191.1	190.89 191.1	n/a	100.00%	n/a	7.34%	WiNGS-Planning v4.0
Distribution Wood Pole Intrusive Inspections (WMP.483)	8.3.4	10%	10%	n/a	20.55 20.86	20.55 20.86	n/a	23.58%	n/a	4.834.91%	WiNGS-Planning v4.0
Risk-Informed Drone Inspections (WMP.552)	8.3.6	29%	29%	n/a	54.95	54.95	n/a	26.97%	n/a	1.56%	WiNGS-Planning v4.0

a. SDG&E does not currently calculate mitigation effectiveness for outage program risk except for WMP.462 and WMP.473.

b. SDG&E's current methodology is designed to calculate the wildfire CBR and is not currently equipped to generate distinct CBR calculations for wildfire and outage program risks.

c. SDG&E does not use HFRA boundaries.

d. SDG&E does not directly calculate the effectiveness of PSPS and PEDS outage mitigations. However, the WiNGS-Planning model estimates risk reduction by simulating an increase in the alert wind gust thresholds.

e. SDG&E does not calculate the CBR and risk reduction for this mitigation. See section 8.2.11.1.4 for details.

f. Activity Effectiveness is when Microgrid is in operation.

g. The Microgrid activity is not designed to mitigate wildfire risk directly. Therefore, CBR and effectiveness specific to wildfire risk are zero.

h. Activity effectiveness percentage is based on subject matter expert assumption.

i. Transmission programs are funded through FERC allocations and, as such, are not included in the calculation of CBR or risk reduction metrics within the WMP.

OEIS Table 8-1: Grid Design, Operations, and Maintenance Targets by Year

Initiative	Quantitative or Qualitative Target	Activity (Tracking ID #)	Previous Tracking ID (if applicable)	Target Unit	2026 Target / Status	% Planned in HFTD for 2026	% Planned in HFRA for 2026	% risk reduction for 2026	2027 Total/ Status	% Planned in HFTD for 2027	% Planned in HFRA for 2027	% risk reduction for 2027	2027 Total/ Status	% Planned in HFTD for 2028	% Planned in HFRA for 2028	% risk reduction for 2028	3-year total	Section; Page number
Work Orders	Qualitative	Corrective Maintenance Program (CMP) (WMP.1433) - Repair wildfire-related conditions within established timeframes	n/a	n/a	By 12/31/2026, complete repairs within required timeframes	n/a	n/a	n/a	By 12/31/2027, complete repairs within required timeframes	n/a	n/a	n/a	By 12/31/2028, complete repairs within required timeframes	n/a	n/a	n/a	n/a	8.6; p. 192~~188~~
Equipment Maintenance and Repair	Qualitative	Transmission Asset Health (WMP.1458) - Analyze asset health for transmission shield wire, insulators, and hardware; explore proactive replacement strategies	n/a	n/a	By 12/31/2026, begin data analysis of asset health, current condition, and outage history of transmission equipment	n/a	n/a	n/a	By 12/31/2027, continue analysis of transmission equipment, and review and adjust replacement strategies	n/a	n/a	n/a	By 12/31/2028, continue analysis of transmission equipment, and review and adjust replacement strategies	n/a	n/a	n/a	n/a	8.4; p. 175~~171~~
Grid Ops and Procedures	Qualitative	Personnel Training (WMP.1452)- Examine electric line crew training and incorporate updates annually.	n/a	n/a	By 12/31/2026, update electric line crew training.	n/a	n/a	n/a	By 12/31/2027, update electric line crew training.	n/a	n/a	n/a	By 12/31/2028, update electric line crew training.	n/a	n/a	n/a	n/a	8.7; 198~~194~~
Workforce Planning	Qualitative	Workforce Planning (Asset Mgmt) - Consult with subject	n/a	n/a	By 12/31/2026, update Storm and PSPS	n/a	n/a	n/a	By 12/31/2027, update Storm and	n/a	n/a	n/a	By 12/31/2028, update Storm and	n/a	n/a	n/a	n/a	8.8; p. 205~~201~~

Initiative	Quantitative or Qualitative Target	Activity (Tracking ID #)	Previous Tracking ID (if applicable)	Target Unit	2026 Target / Status	% Planned in HFTD for 2026	% Planned in HFRA for 2026	% risk reduction for 2026	2027 Total/ Status	% Planned in HFTD for 2027	% Planned in HFRA for 2027	% risk reduction for 2027	2027 Total/ Status	% Planned in HFTD for 2028	% Planned in HFRA for 2028	% risk reduction for 2028	3-year total	Section; Page number
		matter experts to update the Storm and PSPS curriculum. (WMP.1453)			training with lessons learned.				PSPS training with lessons learned.				PSPS training with lessons learned.					
Other grid topology improvements to mitigate or reduce PSPS events	Qualitative	Standby Power Program: (WMP.468) Assess and enable resiliency and backup power solutions for eligible non-residential customers in the high fire threat district.	n/a	n/a	By 12/31/2026, enable backup power solutions of priority sites.	n/a	n/a	n/a	By 12/31/2027, enable backup power solutions of priority sites.	n/a	n/a	n/a	By 12/31/2028, enable backup power solutions of priority sites.	n/a	n/a	n/a	n/a	8.2.11; p. 149~~145~~
Other grid topology improvements to mitigate or reduce PSPS events	Qualitative	Customized Resiliency Assessments: (WMP.1432) Assess and enable resiliency and backup power solutions for eligible residential customers in the high fire threat district.	n/a	n/a	By 12/31/2026, offer resiliency support for eligible customers.	n/a	n/a	n/a	By 12/31/2027, offer resiliency support for eligible customers.	n/a	n/a	n/a	By 12/31/2028, offer resiliency support for eligible customers.	n/a	n/a	n/a	n/a	8.2.11; p. 149~~145~~
Other grid topology improvements to mitigate or reduce PSPS events	Qualitative	Generator Assistance Program: (WMP.467) Provide rebates on backup power	n/a	n/a	By 12/31/2026, enable rebates for backup power	n/a	n/a	n/a	By 12/31/2027, enable rebates for backup power	n/a	n/a	n/a	By 12/31/2028, enable rebates for backup power	n/a	n/a	n/a	n/a	8.2.11; p. 149~~145~~

Initiative	Quantitative or Qualitative Target	Activity (Tracking ID #)	Previous Tracking ID (if applicable)	Target Unit	2026 Target / Status	% Planned in HFTD for 2026	% Planned in HFRA for 2026	% risk reduction for 2026	2027 Total/ Status	% Planned in HFTD for 2027	% Planned in HFRA for 2027	% risk reduction for 2027	2027 Total/ Status	% Planned in HFTD for 2028	% Planned in HFRA for 2028	% risk reduction for 2028	3-year total	Section; Page number
		solutions for eligible customers in the high fire threat district.			solutions for eligible customers.				solutions for eligible customers.				solutions for eligible customers.					
Grid Design and System Hardening	Quantitative	Combined Covered Conductor (WMP.455)	n/a	Miles	50	100%	n/a	23.82%	50	100%	n/a	34.43%	30	100%	n/a	41.73 ~~43.89~~ %	130	8.2.1; p. 135~~131~~
Grid Design and System Hardening	Quantitative	PSPS Sectionalizing Enhancements (WMP.461)	n/a	Switches	7	100%	n/a	n/a	6	100%	n/a	n/a	5	100%	n/a	n/a	18	8.2.11; p. 149~~145~~
Grid Design and System Hardening	Quantitative	Microgrids (WMP.462)	n/a	Microgrids	0	n/a	n/a	n/a	0	n/a	n/a	n/a	1	100%	n/a	100%	1	8.2.7; p. 144~~140~~
Grid Design and System Hardening	Quantitative	Advanced Protection (WMP.463)	n/a	Nodes	30	100%	n/a	1.81%	30	100%	n/a	1.89%	30	100%	n/a	1.88%	90	8.2.8.1; p. 145~~141~~
Grid Design and System Hardening	Quantitative	Strategic Undergrounding (WMP.473)	n/a	Miles	0	n/a	n/a	n/a	0	n/a	n/a	n/a	50	100%	n/a	98.38 %	50	Section 8.2.2; p. 136~~132~~
Grid Design and System Hardening	Quantitative	Distribution Overhead System Hardening (WMP.475)	n/a	Miles	6.53	100%	n/a	3.12%	0	n/a	n/a	n/a	0	n/a	n/a	n/a	6.53	8.2.5.1; p. 141~~137~~
Grid Design and System Hardening	Quantitative	Transmission Overhead Hardening (WMP.543)	n/a	Miles	6.02	100%	n/a	n/a	11.94	100%	n/a	n/a	3	100%	n/a	n/a	20.96	8.2.5.2; p. 143~~139~~
Grid Design and System Hardening	Quantitative	Transmission Overhead Hardening (Distribution	n/a	Miles	1.2	100%	n/a	n/a	7.1	100%	n/a	n/a	3	100%	n/a	n/a	11.3	8.2.5.2; p. 143~~139~~

Initiative	Quantitative or Qualitative Target	Activity (Tracking ID #)	Previous Tracking ID (if applicable)	Target Unit	2026 Target / Status	% Planned in HFTD for 2026	% Planned in HFRA for 2026	% risk reduction for 2026	2027 Total/ Status	% Planned in HFTD for 2027	% Planned in HFRA for 2027	% risk reduction for 2027	2027 Total/ Status	% Planned in HFTD for 2028	% Planned in HFRA for 2028	% risk reduction for 2028	3-year total	Section; Page number
		Underbuild) (WMP.545)																
Grid Design and System Hardening	Quantitative	Strategic Pole Replacement (WMP.1189)	n/a	Poles	200	93%	n/a	1.35%	200	86%	n/a	1.50%	200	70%	n/a	1.36%	600	8.2.10; p. 148~~144~~
Asset Inspections	Quantitative	Distribution Overhead Detailed Inspections (WMP.478)	n/a	Inspections	21,924	100%	n/a	8.10%	17,779	100%	n/a	7.02%	11,537	100%	n/a	7.73 ~~7.76~~%	51,240	8.3.1; p. 157~~153~~
Asset Inspections	Quantitative	Transmission Overhead Detailed Inspections (WMP.479)	n/a	Inspections	2,447	83%	n/a	n/a	2,524	81%	n/a	n/a	2,545	87%	n/a	n/a	7,516	8.3.2; p. 159~~155~~
Asset Inspections	Quantitative	Transmission Infrared Inspections (WMP.482)	n/a	Inspections	7,294	84%	n/a	n/a	7,294	84%	n/a	n/a	7,294	84%	n/a	n/a	21,882	8.3.3; p. 161~~157~~
Asset Inspections	Quantitative	Distribution Wood Pole Intrusive Inspections (WMP.483)	n/a	Inspections	1,214	100%	n/a	2.62%	5,477	100%	n/a	3.94%	11,923	100%	n/a	5.23 ~~5.33~~%	18,614	8.3.4; p. 163~~159~~
Asset Inspections	Quantitative	Transmission Wood Pole Intrusive Inspections (WMP.1190)	n/a	Inspections	68	100%	n/a	n/a	196	100%	n/a	n/a	24	100%	n/a	n/a	288	8.3.5; p. 165~~161~~
Asset Inspections	Quantitative	Risk-Informed Drone Inspections (WM.552)	n/a	Inspections	6,500	85%	n/a	1.24%	6,500	96%	n/a	1.54%	6,500	98%	n/a	1.91%	19,500	8.3.6; p. 166~~162~~
Asset Inspections	Quantitative	Distribution Overhead Patrol Inspections (WMP.488)	n/a	Inspections	84,678	100%	n/a	7.34%	84,678	100%	n/a	7.34%	84,678	100%	n/a	7.34%	254,034	8.3.7; p. 170~~166~~

Initiative	Quantitative or Qualitative Target	Activity (Tracking ID #)	Previous Tracking ID (if applicable)	Target Unit	2026 Target / Status	% Planned in HFTD for 2026	% Planned in HFRA for 2026	% risk reduction for 2026	2027 Total/ Status	% Planned in HFTD for 2027	% Planned in HFRA for 2027	% risk reduction for 2027	2027 Total/ Status	% Planned in HFTD for 2028	% Planned in HFRA for 2028	% risk reduction for 2028	3-year total	Section; Page number
Asset Inspections	Quantitative	Transmission Overhead Patrol Inspections (WMP.489)	n/a	Inspections	7,454	84%	n/a	n/a	7,454	84%	n/a	n/a	7,454	84%	n/a	n/a	22,362	8.3.8; p. 171~~167~~
Asset Inspections	Quantitative	Substation Patrol Inspections (WMP.492)	n/a	Inspections	381	100%	n/a	n/a	381	100%	n/a	n/a	381	100%	n/a	n/a	1,143	8.3.9; p. 173~~169~~

8.2 GRID DESIGN AND SYSTEM HARDENING

8.2.1 COMBINED COVERED CONDUCTOR INSTALLATION (WMP.455)

8.2.1.1 TRACKING ID

WMP.455

8.2.1.2 OVERVIEW OF THE ACTIVITY

The Combined Covered Conductor Program (WMP.455) replaces bare conductors with covered conductors in the HFTD and, as needed, includes additional equipment replacements and installations such as structures, lighting arrestors, fuses, connectors, and avian protection. Covered conductors are manufactured with an internal semiconducting layer and external insulating ultraviolet-resistant layers to provide incidental contact protection. The WiNGS-Planning model is utilized to prioritize installation within the HFTD.

Targets for the 2026 to 2028 WMP cycle are provided in OEIS Table 8-1.

8.2.1.3 IMPACT OF THE ACTIVITY ON WILDFIRE RISK

Trend Analysis

Implementation of the Combined Covered Conductor Program began in 2020. As of the end of 2024, 183 miles were reinforced with covered conductors. Due to the limited extent of implementation and available data, it is not yet feasible to conduct a comprehensive trend analysis of the program.

SDG&E participated in a Joint IOU study that resulted in a detailed assessment of the efficacy of covered conductors by driver. The effectiveness of the Combined Covered Conductor Program varies based on each ignition cause (e.g., the activity reduces ignitions caused by animal contact, balloon contact, and vegetation contact by an estimated 90 percent while it reduces ignitions caused by vehicle contact by an estimated 20 percent). By applying these findings to ignition counts and evidence of heat data, it was determined that the use of combined covered conductors results in a 46 percent efficacy in risk reduction.

Wildfire Risk Reduction

This program reduces the likelihood of ignitions because covered conductors are manufactured with an internal semiconducting layer and external insulating ultraviolet-resistant layers to provide incidental contact protection. All connections are insulated, and any exposed conductor ends are covered with insulation. This program includes installation of additional equipment such as lightning arrestors, transformer bushings, fuses, and other equipment use avian cover-up material that can also provide incidental contact protection. Combined Covered Conductor does not impact the consequence of ignitions.

For the target scoped in the 2026 to 2028 WMP cycle, the expected risk reduction is 23.82 percent for 2026, 34.43 percent in 2027, and 41.73~~43.89~~ percent in 2028.

For an explanation of the calculation, a list of assumptions, and justifications for each assumption see Appendix G.

OEIS Table 9-2: Vegetation Inspections and Pole Clearing Targets by Year

Activity (Program)	Tracking ID	Previous Tracking ID, if applicable	Target Unit	Cumulative (Cml.) Quarterly Target 2026 Q1	Cml. Quarterly Target 2026, Q2	Cml. Quarterly Target 2026, Q3	Cml. Quarterly Target 2026, Q4	Cml. Quarterly Target 2027, Q1	Cml. Quarterly Target 2027, Q2	Cml. Quarterly Target 2027, Q3	Cml. Quarterly Target 2027, Q4	Cml. Quarterly Target 2028, Q1	Cml. Quarterly Target 2028, Q2	Cml. Quarterly Target 2028, Q3	Cml. Quarterly Target 2028, Q4	% HFTD Covered in 2026	% Risk Reduction for 2026	% Risk Reduction for 2027	% Risk Reduction for 2028	3-year Total	Activity Timeline Target	Section; Page Number
Detailed Inspection	WMP.494	n/a	Inspections	60,080	140,365	207,680	255,000	60,080	140,365	207,680	255,000	60,080	140,365	207,680	255,000	100%	4.82 ~~0.97~~%	4.82 ~~0.97~~%	4.82 ~~0.97~~%	765,000	12/31/2028	9.2; p. 213~~209~~
Off-Cycle Patrol	WMP.508	n/a	VMAs	25	44	92	106	25	44	92	106	25	44	92	106	100%	4.82 ~~0.97~~%	4.82 ~~0.97~~%	4.82 ~~0.97~~%	318	12/31/2028	9.2; p. 213~~209~~
Pole Clearing	WMP.512	n/a	Poles	4,479	12,196	20,875	22,000	4,479	12,196	20,875	22,000	4,479	12,196	20,875	22,000	100%	4.83 ~~0.98~~%	4.83 ~~0.98~~%	4.83 ~~0.98~~%	66,000	12/31/2028	9.4; p. 216~~212~~

OEIS Table 9-5: Vegetation Management QA and QC Program Objectives

Initiative/Activity Being Audited	Tracking ID	Quality Program Type	Objective of the Quality Program
Detailed Inspections, Prune and Removal (Clearance), and Pole Clearing	WMP.494 WMP.501 WMP.512	QA/QC	Ensure contractors are following SDG&E contractual requirements, procedures, and standards for safety, compliance, and reliability.

OEIS Table 9-6: Vegetation Management QA and QC Activity Targets

QA/QC Activity Name*	Initiative/ Activity Being Audited	Population / Sample Unit	2026: Population Size	2026: Sample Size	2026: % of Sample in HFTD	2027: Population Size	2027: Sample Size	2027: % of Sample in HFTD	2028: Population Size	2028: Sample Size	2028: % of Sample in HFTD	Confidence level / MOE	2026 : Pass Rate Target	2027 : Pass Rate Target	2028 : Pass Rate Target
Quality assurance/quality control of Vegetation Management (WMP.505)	Detailed Inspections (WMP.494) Prune and Removal (Clearance) (WMP.501) Pole Clearing (WMP.512)	Inspections	277,000**	15%	100%	277,000**	15%	100%	277,000**	15%	100%	99%/3.0%	90%	90%	90%

**This column was added by SDG&E and is not in the OEIS WMP Guidelines*

*** ** Population size is 255,000 for Detailed Inspections and 22,000 for Pole Clearing. Prune and Removal activities are also subject to QA/QC; however, the population size for this activity is determined upon completion of inspections. The QA/QC sample size is 15% for all activities. ~~Prune and Removal activities are also subject to QA/QC; however, population size is determined upon completion of inspections~~*

following year. Forecasts for future open work orders are expected to remain consistent with the historical 5-year average.

OEIS Table 9-7 and OEIS Table 9-8 show the average ~~total~~ number of tree units within the HFTD that were past due at the end of years 2022, 2023, and 2024. Work order scheduling is dependent on the condition code of the tree. Routine work is generally scheduled to be completed within 120 days of inspection, whereas priority work is generally scheduled to be completed within 30 days of inspection. Various factors including access restrictions, customer refusals, permitting delays, environmental review or restrictions, and agency restrictions may impact the scheduled work.

OEIS Table 9-7: Number of Past Due Vegetation Management Work Orders Categorized by Age and HFTD Tier

HTFD Area	0-30 Days	31-90 Days	91-180 Days	181+ Days
HFTD Tier 2	752~~,514~~	2253~~,601~~	553	170
HFTD Tier 3	300~~790~~	292~~,475~~	1411	02

OEIS Table 9-8: Number of Past Due Vegetation Management Work Orders Categorized by Age and Priority Levels

Priority Level	0-30 Days	31-90 Days	91-180 Days	181+ Days
Low Priority	403~~,220~~	126~~,039~~	2463	069
High Priority	33584	24237	41	13

Note: Table based on HFTD operations/units

9.13 WORKFORCE PLANNING (WMP.506)

OEIS Table 9-9: Vegetation Management Qualifications and Training

Worker Title	Minimum Qualifications for Target Role	Applicable Certifications	# of Electrical Corporation Employees with Min Quals	# of Electrical Corporation Employees with Special Certifications	# of Contracted Employees with Min Quals	# of Contractor Employees with Applicable Certifications	Total # of Employees	Reference to Electrical Corporation Training/Qualification Programs
Vegetation Management Compliance Manager	Bachelor's Degree in Forestry, Biology, or Horticulture and/or equivalent training/experience. 7 years' experience in Utility Vegetation Management.	International Society of Arboriculture (ISA) Certified Arborist ISA Utility Specialist	1	1	n/a	n/a	1	International Society of Arboriculture Certified Arborist Program
Vegetation Management WMP Manager	Bachelor's Degree in Forestry, Biology, or Horticulture and/or equivalent training/experience.	International Society of Arboriculture (ISA) Certified Arborist ISA Utility Specialist	1	1	n/a	n/a	1	International Society of Arboriculture Certified Arborist Program
Vegetation Management Operational Manager	Bachelor's Degree in Forestry, Biology, or Horticulture and/or equivalent training/experience 7 years' experience in Utility Vegetation Management, including 3 years in contractor management	International Society of Arboriculture (ISA) Certified Arborist ISA Utility Specialist	1	1	n/a	n/a	1	International Society of Arboriculture Certified Arborist Program
Vegetation Management Business Advisor	Bachelor's degree in Finance, Accounting, Data Analytics, Business Administration, or related	No special certification required	1	n/a	n/a	n/a	1	n/a
Vegetation Management Senior Data Analyst	Bachelor's degree in Engineering, Economics, Finance, Data Analytics, or related	No special certification required	2	n/a	n/a	n/a	2	n/a
Area Forester/ Contract Administrator	3 years' utility vegetation management experience. Bachelor's degree in Forestry, Biology, Horticulture, or related field (preferred).	International Society of Arboriculture (ISA) Certified Arborist	8	8	n/a	n/a	8	International Society of Arboriculture Certified Arborist Program

Worker Title	Minimum Qualifications for Target Role	Applicable Certifications	# of Electrical Corporation Employees with Min Quals	# of Electrical Corporation Employees with Special Certifications	# of Contracted Employees with Min Quals	# of Contractor Employees with Applicable Certifications	Total # of Employees	Reference to Electrical Corporation Training/Qualification Programs
Vegetation Management Lead Forester	Bachelor's degree in Forestry, Biology, Horticulture, or related field (preferred). 3-5 years' experience administering vegetation management programs. Supervisory experience working with external contractors.	International Society of Arboriculture (ISA) Certified Arborist	1	1	n/a	n/a	1	International Society of Arboriculture Certified Arborist Program
Forester Patrol Person	3 years' utility vegetation management experience. Bachelor's degree in Forestry, Biology, Environmental Science, Horticulture, or related field (preferred).	International Society of Arboriculture (ISA) Certified Arborist	4	4	n/a	n/a	4	International Society of Arboriculture Certified Arborist Program
Resource Coordinator (Customer Help Desk)	High school diploma, college courses (preferred). 3 years' customer service experience. Microsoft Office proficiency. Strong technical writing skills (preferred). Working knowledge of Mainframe, GIS, SAP and Distribution Planning Scheduling applications (preferred).	No special certification required	3	n/a	n/a	n/a	3	n/a
Auditor	Bachelor's degree in Forestry, Biology, Environmental Science, Horticulture, or related field (preferred); Current Class C Driver's License with clean driver safety record	International Society of Arboriculture (ISA) Certified Arborist	n/a	n/a	29	16	29	International Society of Arboriculture Certified Arborist Program
Pre-Inspector	Bachelor's degree in Forestry, Biology, Environmental Science, Horticulture, or related field (preferred). Current Class C driver's license with clean driver safety record.	International Society of Arboriculture (ISA) Certified Arborist	n/a	n/a	62~~47~~	53	62	International Society of Arboriculture Certified Arborist Program
Tree Trim General Foreperson/ Supervisor	5 years' line clearance tree pruning experience as a Foreman. Current California driver's license (Class B endorsement). General computer knowledge. Strong leadership qualities.	International Society of Arboriculture (ISA) Certified Arborist	n/a	n/a	12~~7~~	7	12	International Society of Arboriculture Certified Arborist Program

Worker Title	Minimum Qualifications for Target Role	Applicable Certifications	# of Electrical Corporation Employees with Min Quals	# of Electrical Corporation Employees with Special Certifications	# of Contracted Employees with Min Quals	# of Contractor Employees with Applicable Certifications	Total # of Employees	Reference to Electrical Corporation Training/Qualification Programs
Tree Trimmer	Current California driver's license (Class B endorsement). General computer skills.	Line-Clearance Qualified Arborist (or Trainee)	n/a	n/a	148~~133~~	148	148	United States Department of Labor Standard OSHA 1910.269; ANSI Z133 Safety Standards
Pole Brush General Foreman / Supervisor	5 years' line clearance tree pruning experience as a Foreman. Current California driver's license (Class C endorsement). General computer knowledge.	Qualified Applicator Certification	n/a	n/a	5	3	5	California Department of Pesticide Regulation Licensing Program
Pole Brusher	Current California driver's license (Class C endorsement). General computer skills.	No special certification required	27	n/a	n/a	n/a	27	n/a

4.4.5 THIRD PARTY RECOMMENDATIONS

Table 4-1: WiNGS-Planning Third Party Recommendations ~~Risk Modeling Updates~~

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
R1.1	Data Ownership	Ensure that there is an integrated function, such that communication from specific data owners is cohesive and timely. This would ensure the communication of definitions, use, bounds for validity, and decisions on changes. Data owners would also be responsible for ensuring that the data is up to date and accessible.	Severity Level: Medium – lack of communication from data owners may result in unexpected changes and diminished data integrity. The data owner is accountable for the use, quality and protection of a dataset.	2027 ~~2026~~	In progress
R1.2	Calculation Ownership	Assign owners of specific constants (e.g., PSPS risks) and calculation methodologies such that their definitions and approaches are agreed, documented and uniform across the business. This is to ensure that any colloquial terms used for aggregated data assets are consistent such that an output like "miles of span in HFTD" in one group's calculation is the same as another's.	Severity Level: Low – a calculation owner will be accountable for ensuring calculation methodologies are clearly defined and are used appropriately and consistently.	2027 ~~2026~~	In progress
R1.3	Model Ownership	Broaden model ownership in the form of a board or group with regular meeting cadence to agree to higher-level changes and adjustments, reviewing output of sensitivity analysis and changes prior to implementation. This would ensure that the responsibility for driving the direction of overall model enhancements is agreed upon amongst the Developers, Wildfire Mitigation team, and the Business users.	Severity Level: Low – without regular communication between all stakeholders, the direction and prioritization of model development and improvements can be missed.	2023	Complete
R1.4	Develop New Vegetation Risk Model	Development of a new Vegetation Risk Model, replacing the GIS Surveyors, Inc. (GSI) Tree Strike input, which is based on 2018 data. A sensitivity analysis should be performed to capture any changes.	Severity Level: Medium – development of a new vegetation risk model has the potential to change the ignition rate vegetation adjustment step, which will change the risk scores and may alter the mitigation rankings.	2023	Complete
R1.5	Refresh CHI	Replace/refresh the CHI input to incorporate updated data and ensure data components are not utilized more than once in the same calculations. A sensitivity	Severity Level: Medium – updating the CHI values will likely result in minor changes to the ignition rate asset health adjustment	2025	Complete

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
		analysis should be performed to capture any changes.	step which will change the risk scores slightly and may impact the mitigation rankings.		
R1.6	Update Data Input Check	Review the models and components utilized in WiNGS-Ops to validate whether an updated data input is available. This must be done while ensuring that the purpose and definition of the data is fully understood so any data assets or model inputs from WiNGS-Ops are complimentary to the existing WiNGS-Planning model.	Severity Level: Medium – updating constants will alter the final risk score results; however, the mitigation rankings may not change or may only change slightly.	2024	Complete
R2.1	Model Value	In order to quantify the value, the model brings to the business, define a measurable metric that clearly shows what benefit the model is providing in order to evaluate if the value offsets the costs. A potential metric could be tracking the percent Electric System Hardening (ESH) deviates from the model recommendations.	Severity Level: Low – while not directly affecting the model output, it is best practice to regularly evaluate the value a model brings to a business to determine future growth and investment.	2027 ~~2026~~	In Progress ~~Not Started~~
R2.2	Initiation Stage Documentation	Document the initiation stage in order to capture critical elements of the initial planning stage. This includes defining what problem this model will solve, what is the feasibility of the model, who are the end users and how do they want to ingest the model outputs, who are the subject matter experts and what is their ability to participate in the model development, who will be the business owner of the model, what are the initial assumptions and how were they determined, and confirmation that all relevant business areas have taken full sponsorship of the project. Additional details on why certain decisions were made with respect to model generation are also critical to document in the initiation process.	Severity Level: Medium – due to the lack of documentation from the initiation of the WiNGS-Planning model, there are several assumptions and decisions that were made that cannot be explained now that the original stakeholders are no longer with the company.	2026	In progress
R3.1	Data Documentation and Dictionaries	Document for all input data, which should include the data owner, the context of the data, data collection methodology, structure and organization of the data, data validation and quality assurance	Severity Level: Low – not having documentation or data dictionaries do not prevent the model from running, however, there is a risk of misunderstanding	2026	In progress

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
		steps, data manipulations from raw data, and data confidentiality, access and use conditions. If applicable, it should also include any calculations used to derive any of the fields, data dictionary of input data into those calculations, assumptions, references to methodologies or assumptions, and any limitations of the data. This will ensure a detailed understanding of the data that can be referenced as needed. Additionally, develop data dictionaries for all input data, which should list all the data fields. Each data field listing should include a description, data type, acceptable numerical ranges or classification values if applicable, units, if mandatory, null or missing value definition, effective date, and update information (including date of update, by who, what was updated, and why). This will ensure a thorough understanding of each data field, as well as a reference for data validation steps.	the data, or if there is turnover on the data science team, new team members will have a more challenging time referencing and understand the data inputs.		
R3.2	Data Input Validation	Implement an automated data validation check for every data input to look for outliers, errors, text control, contradictions, etc. Each of these validation checks should have associated documentation that includes what to do when data is missing or anomalous. Examples of how outliers, errors, contradictions, etc. are detected and how corrections are performed in a demonstratable way should be provided if necessary.	Severity Level: Medium – there is currently a lot of reliance on source data owners to validate their data, which can lead to errors and reduce data quality.	2026	In progress
R3.3	Constants	Store constants used in the model calculations somewhere other than code itself. This will allow for better documentation of the assumptions that go into the constants decisions and will result in ease of readability for review.	Severity Level: Low – this recommendation will not change any of the model outputs, however there is room to improve how to view the values, include all the proper documentation (see recommendation R2.1) and track changes (When it was changed, from what value, by who, and full reasoning for the change).	2023	Complete

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
R3.4	LiDAR Tree Data	Update tree locations based on available LiDAR data to present a more accurate count of strikes per mile input for the circuit segments.	Severity Level: Medium – updating tree locations will likely change the tree strike potentials for circuit segments.	2027 ~~2026~~	Not Started
R3.5	Shorter Than Conductor Height Trees Strike Buffer	Consider updating the tree strike model to address short trees that cannot hit the conductors based on the actual conductor height.	Severity Level: Medium – accounting for shorter trees that are not likely to fall into conductors may be over-represented in the risks currently captured.	2024	Complete
R3.6	CHI Update	Refresh or update the CHI input data, which was last refreshed in 2020, so it contains the most relevant data to provide the latest contribution to the modelling output.	Severity Level: Medium – updating the CHI values, will likely result in minor changes to the ignition rate asset health adjustment step and will probably have minimal impact on mitigation rankings.	2025	Complete ~~Not Applicable~~
R4.1	Derived Field Data Dictionaries	Add more detailed documentation to data dictionaries for each derived field that includes the calculation, data validation and quality assurance steps, data manipulations, null or missing value definition and/or handling, acceptable numerical ranges if applicable, effective date, and update information (including date of update, by who, what was updated, and why).	Severity Level: Low – Detailed documentation and data dictionaries are critical for ensuring an understanding of the generated data. Without them, there is a risk of misunderstanding the data or how to validate the results, particularly if there is turnover on the data science team. Having	2023	Complete
R4.2	Derived Data Validation	In line with recommendation R3.2, incorporate data validation steps when new fields are derived to ensure the generated data is explainable, and include documentation that explains the validation steps taken and what to do when data is missing or anomalous. Provide examples of how flagged data is detected and how corrections are performed in a demonstratable way if necessary.	Severity Level: Medium – validating derived data is an important step for ensuring the most accurate model outputs. Some values are valid on their own which allows them to make it through the initial data ingest validation step, but when put in context with another value, it may indicate the data is an outlier.	2026	In progress
R4.3	Ignition Rate Veg Adjustment 0.001 Adder	Perform a detailed analysis of this step to confirm it is unnecessary, which will reduce the technical debt as well as reduce the amount of unnecessary documentation, especially when there is no explanation for this step.	Severity Level: Low – this step performs no function and therefore will not have any effect on the model results.	2023	Complete
R4.4	Mean Value Assessment	Conduct a detailed assessment of the instances where mean values	Severity Level: Medium – if it is determined that using	2027 ~~2025~~	In progress

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
		are utilized in the calculations in order to determine if the approach would correctly account for outliers, potentially presenting a less risky situation than is accurate.	mean values does not correctly account for outliers and a decision to use something other than mean values is made, then the data will change, which will result in a change to the risk score.		~~Not Applicable~~
R5.1	Stakeholder Involved Sensitivity Analysis	Conduct a more robust sensitivity analysis at a regular cadence (as outlined in ASTM E 1355 Section 10). Business stakeholders should be made aware of this sensitivity analysis and should be invited to participate in choosing the variables and their value ranges. The business users should then be involved in all output reviews and have the suggested changes/ remediation actions presented to them, such that the impacts may be fully understood and agreed with.	Severity Level: Medium – a sensitivity analysis will provide the end users a better understanding of how different values affect the model as well as help identify which values are influencing the model the most. This will allow the end users to make more informed decisions when determining if they need to deviate from the model results.	2028 ~~2026~~	In progress
R5.2	Customer Type Multiplier Sensitivity Analysis	Perform a sensitivity analysis on the results of the customer type weight multipliers to evaluate if any unintended bias has resulted by adding weights to certain types of customers. This could include understanding the distribution of medical baseline and urgent customers relative to certain areas that may result in a decreased hardening priority.	Severity Level: Medium – if the results of the study indicate that the different customer type multipliers have the potential to adversely impact certain communities or demographics and the multiplier values are adjusted, that will result in changes to the CoRE model outputs and may change the mitigation rank for certain segments.	2028 ~~2026~~	Not Started
R5.3	Formalize Model Validation Process	Devise and document formal process for validating the overall model outputs. This can be completed by comparing the run's results with previous iterations' outputs as well as identifying outputs that appear erroneous. It is also recommended to engage the end users to incorporate any additional thoughts or checks they have into the validation process.	Severity Level: Low – a formalized model validation process will instill greater trust by end users by knowing how the model results are validated prior to receiving the outputs and can reference any generated validation reports.	2027 ~~2026~~	In progress
R5.4	Formalize External Feedback Management Process	Create formalized demand management process for external parties to provide feedback and request adjustments to the models. This will ensure that as the team, model, and user base	Severity Level: Low – this will not directly affect the model outputs; however, this is an important validation step between model developers and end	2026	In progress ~~Not Started~~

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
		continue to grow, there is a robust mechanism through which updates may be requested, tracked, and implemented in the Cloud environment.	users to continue to facilitate model development, accuracy, and value to the business.		
R6.1	Standardize Model Notifications	Create a standardized approach for how model update notifications are delivered and work with end users to capture the correct granularity and details that they would need to understand the changes.	Severity Level: Low – this recommendation will not have any effect on the model output but ensures that the appropriate level of communication is delivered between the development team and the end users.	2028 ~~2026~~	In progress
R6.2	Docstring Best Practice	Ensure all python functions have docstrings, as older functions have not been updated. This will ensure that all functions are correctly documented, and definitions, descriptions, and decision point reasoning are captured. Docstring best practice for a function includes a brief description of what the function is and what it is used for, any arguments that are passed, labeling what is required and what is optional, any restrictions on when the function can be called, and/or any exceptions that are raised.	Severity Level: Low – this recommendation will not affect the model outputs but is a best practice to follow when writing code.	2023	Complete
R6.3	Profiler	Run a profiler to identify any unused code that is taking up unnecessary technical debt.	Severity Level: Low – this recommendation does not affect the model output but may improve the runtime performance of the model.	2028 ~~2026~~	In progress
R6.4	Unit Testing	Incorporate unit testing to ensure all functions are performing as expected.	Severity Level: Low – this recommendation will only affect the model if any functions are not performing as they should.	2026	In progress
R7.1	End User Data Consumption	Work with end user to see how they would like to consume the data, then develop and implement a standard way of delivering data.	Severity Level: Low – this recommendation has no effect on the model output results, but it is important to establish the most efficient way to deliver the output results to the end users.	2028 ~~2026~~	In progress
R7.2	Aws Billing Limits	Introduce billing limits for certain sandbox/development activities such that there is not a risk of an unintended spike in cloud costs for a development error.	Severity Level: Low – this recommendation is to ensure that model costs are monitored and meet the set budget.	2026 ~~2025~~	In progress ~~Complete~~

ID	Recommendation Name	Description	Severity Level and Impact	Target Deadline (EOY)	Status
R7.3	AWS~~Aws~~ Access Control	Review access control principles, focused on two areas: • Review the default access periods, so access is revoked if someone doesn't access for a given period of time. • Consider enabling row or column-level security to ensure users only access certain subsets of data most relevant and appropriate to them. This will become more needed in the WiNGS-Planning visualization tool.	Severity Level: Low – following the security pillar from the 6 pillars of the AWS Well-Architected Framework will ensure the confidentiality and integrity of the data and prevent unauthorized access and changes to the model and systems.	2026 ~~2028~~	Not Started
R7.4	Single Cloud Vendor Consolidation	In the future, consolidate services under one cloud provider for ease of use, integration, and billing. This can ensure that future updates to any of the cloud services are always made in a way to keep compatibility and seamless integration with the other developed components.	Severity Level: Low – this recommendation has no impact on the output of the WiNGS-Planning model but would allow for greater efficiency in use of cloud services.	2028	Not Started
R7.5	AWS Athena Consolidation	With improved Governance of the data, create only one instance of AWS Athena, with the GIS and Flat File data combined into the Data Mesh layer. With the data available in the Data Mesh, appropriate ownership and controls must be established such that any shared data is used within the bounds of its intended purpose.	Severity Level: Low – reducing from multiple instances of AWS Athena down to one would ensure efficiency of use and a lower overhead to manage, monitor, and maintain.	2028	In progress
R7.6	Go / No-Go	Engage with business users for a release of a new model version in the form of a Go/No-Go meeting such that the end users are engaged in the decision to approve a release and are made aware of any projected impact or change.	Severity Level: Medium – by performing a Go/No-Go meeting, there is assurance that the end-users understand and approve the newest model version. Without this assurance, the end users may not fully understand the latest model outputs, which could result in a misinterpretation of the model outputs.	2025	Complete
R7.7	Separate Access On AWS	Create separation in the access to Cloud workspaces as the products mature.	Severity Level: Low – this would allow more control over access control, budget planning, and spend tracking for the separate groups.	2028	Not Started

Table 4-2: WiNGS-Ops Third Party Recommendations ~~Risk Modeling Updates~~

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
R1.1	Model Approach Standardization	Expand standardization to all aspects of model development so that all models are tested and validated to the same specification. As most of the model build is independent, there is a potential lack of standardization for the development, training, testing and validations of models.	Severity Level: Low – without a standardized approach, each model may not hold the same level of credibility given varying levels of testing and validation. Standardization would improve consistency of model outputs.	2023	Complete
R1.2	Internal Model Review Process	Implement a level of peer-review to validate the scripts that are developed and operated. Creation of a more formalized internal model review process would provide a forum through which ideas may be discussed and considered before implementation, and through which a robust and consistent approach to model review may be performed.	Severity Level: Medium – this would enable potential improvements or ideas to be highlighted and discussed, leading to more effective and efficient models.	2023	Complete
R1.3	Model Documentation	Ensure documentation is complete for each of the latest model versions to be released for fire season 2023. As the team has been operating in a reactive state to changes in the WMP guidelines and recommendations, full documentation of each of the models is not complete and there is heavy reliance on the experience and knowledge of the individual team members.	Severity Level: Low – without robust model documentation, there is a reliance on the experience and memory of team members to explain the reasoning behind model decisions and changes.	2023	Complete
R1.4	Team Enhancements	Enhance the team with the addition of 1) a scrum master who can help generate and manage a backlog of tasks and activities such that activities may be prioritized, and a demand management process may be created and 2) a data analyst who could assist with external regulatory data requests, alleviating some of the time demands of the WiNGS-Ops Data Science team. The team consistently faces capacity constraints due to the ever-changing landscape of the WMP guidelines and recommendations, coupled with continued regulatory requests for data and information. As such, the team operates reactively to requests and priorities, without a true backlog of tasks captured and delivered against.	Severity Level: Medium – without changes to the team size and team roles, the full potential of members of the team may not be realized. Improved team size, capability, and demand management would allow for a more optimal environment, within which the greatest value may be generated.	2023	Complete

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
R1.5	Data Owner Communication	Ensure that there is an integrated function, such that communication from specific data owners is cohesive and timely. This would ensure the communication of definitions, use, bounds for validity, and decisions on potential changes. Data owners would also be responsible for ensuring that the data is up to date and accessible.	Severity Level: Medium – lack of communication from data owners may result in unexpected changes and diminished data integrity.	2026	In Progress
R1.6	Calculation Ownership	Assign owners of specific constants (e.g., PSPS risks) and calculation methodologies such that their definitions and approaches are agreed, documented and uniform across the business. This is to ensure that any colloquial terms used for aggregated data assets are consistent such that an output like "miles of span in HFTD in one group's calculation is the same as another's.	Severity Level: Low – a calculation owner will be accountable for ensuring calculation methodologies are clearly defined and are used appropriately and consistently.	2026	In Progress
R1.7	Model Ownership	Implement broader model ownership in the form of a board/ group with regular meeting cadence to agree to higher-level changes and adjustments, reviewing output of sensitivity analysis and changes prior to implementation. This would ensure that the direction of overall model enhancements and improvements is agreed amongst the Developers, Wildfire Mitigation team, and the Business users.	Severity Level: Low – without regular communication between all stakeholders, the direction and prioritization of model development and improvements can be missed.	2027 ~~2026~~	In Progress
R1.8	EAMP Data Experts	Onboard an internal team to share subject matter expertise responsibility for EAMP/Asset 360. EAMP/Asset 360 provides a rich asset data source used in modeling. The data itself is a clean and curated version of GIS and Asset Management data. Currently, the program is operated by external contractors who also remain as the data source subject matter experts. The source, including all dictionaries and implemented manipulations, should also be fully documented such that any new user may easily gain a complete understanding of the data and its use.	Severity Level: Medium – with a continued reliance on external parties for this critical data source, the team will not gain full ownership, understanding, and control over the underlying data. Internal subject matter expertise in the data source will ensure a robust and future-proof mechanism for data understanding, questions, and data updates.	2025~~2028~~	Complete ~~In Progress~~
R1.9	External Inference Team	Integrate more SDG&E resources into the inference team so that knowledge and experience is internalized and reliance on external contractors is	Severity Level: Low – as the WiNGS-Ops model continues to mature and gain complexity, the	2028	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		reduced. Currently, the development team responsible for the inference aspects of WiNGS-Ops are a group of external contractors. The team is effective in the conversion of models from training and test phase to inference phase but do not look to challenge the training team to improve the models.	technical debt on external development members of the Advanced Analytics team will grow, increasing this reliance.		
R2.1	OIR Requirements	Build and maintain a formalized report that tracks OIR requirements and how they were carried out in order to ensure that all Order Instituting Rulemaking (OIR) requirements are met and prevent possible violations. Having this existing documentation will not only confirm what the requirements are and if and how they were completed but will also be ready to pass along to the OIR as appropriate.	Severity Level: Low – this will help prevent potential violations from the OIR by tracking all the requirements and how they were completed.	2028	In Progress
R2.2	Model Change Documentation	Create a formal process through which requirements for model changes are captured, tracked, and completed against. This will ensure that changes are understood and captured correctly and will allow success criteria to be defined and assessed against by the end users in their approval of model changes.	Severity Level: Low – without a documented process, requirements and requested changes may be incorrectly implemented or the end users may not have an easy mechanism for change approval.	2026 ~~2025~~	In progress ~~Complete~~
R2.3	Model Value	Establish metric(s) to gauge the effectiveness of the model, which will help determine the value the model is bringing to the business. This will ensure that the impact of model improvements and developments over time are quantified and tracked.	Severity Level: Low – this recommendation will increase end user buy in and understanding of the changes that are enacted in the model.	2023	Complete
R2.4	Initiation Stage Documentation	Document the initiation stage in order to capture critical elements of the initial planning stage. This includes defining what problem this model will solve, what is the feasibility of the model, who are the end users and how do they want to ingest the model outputs, who are the subject matter experts and what is their ability to participate in the model development, who will be the business owner of the model, what are the initial assumptions and how were they determined, and confirmation that all relevant business areas have taken full sponsorship of the project. Additional details on why certain decisions were made with respect to model generation	Severity Level: Low – without this documentation in place, future developers and end users may have a more difficult time understanding the decisions and assumptions that were made, which subject matter experts to turn to for input, how the model will be measured for success, or the original problem and objectives.	2026	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		are also critical to document in the initiation process.			
R3.1	Data Input Validation	Implement an automated data validation check for every data input to look for outliers, errors, text control, contradictions, etc. Each of these validation checks should have associated documentation that includes what to do when data is missing or anomalous. This should be implemented in the inference pipeline and should be consistent with data validation performed by the WiNGS-Ops data science team during their exploratory data analysis process.	Severity Level: Medium – there is currently a lot of reliance on source data owners to validate their data, which can lead to errors and reduce data quality.	2026	In Progress
R3.2	Pole and Span Imputation	In collaboration with the GIS team, develop a logic-based solution for imputing pole location information using other fields when historical pole locations are missing. This may include utilizing an existing GIS redlining process for resolving these gaps.	Severity Level: Low – this would ensure that the data used in modeling is most representative of the network. It may also help reduce the number of minority class records that are dropped due to missing data.	2028	In Progress
R3.3	Network As Switched Limitation	Note this as a limitation of the model and prior to PSPS activations that the systems are restored to the as-designed states wherever possible. In addition, contact Operations personnel to confirm the correct owner of the network as-operated electrical connectivity data since this data is a critical component of the WiNGS-Ops model. Seeking out information on the root data source, how it is validated, and the existing assumptions are critical for ensuring a complete understanding of the data and its correct use.	Severity Level: Low – without knowing the correct data owner or who to reach out to with concerns or data issues, there will be continued uncertainty of the data and of the stewardship and accountability surrounding that data.	2023	Complete
R3.4	Data Object Governance	Increase governance and controls for each of the data objects utilized by WiNGS-Ops such that none of the data created for and used in the models is inadvertently used for a different purpose, generating alternative and incorrect views of the landscape.	Severity Level: Low – although this may not directly impact the output of the WiNGS-Ops model, it may affect the credibility of the data sources used if the source is used incorrectly elsewhere.	2026	In Progress
R3.5	SAIDIDAT Data Ingestion	Perform a direct query of SAIDIDAT data from its source database. This eliminates the reliance on individuals and prevents potential human error.	Severity Level: Low – manual data request and transfers are reliant on the requestor to ask for the information.	2026	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
			Automating the request process may be a better way to obtain updated outage history data on a scheduled basis rather than on an as-requested basis.		
R4.1	Feature Removal	For the models that do not have auto regularization, remove the less relevant features as measured by the feature importance function outputs. Removing less relevant features will help with the stability of the model, avoid overfitting, and reduce computation cost.	Severity Level: Medium – it is unclear at this stage the impact that inclusion of these unimportant features has on the outputs. Removing them has the potential to skew results which may have a large impact, so has been rated as such.	2026	In Progress
R4.2	Alternative Land Use Data Source	Work closely with the SANGIS team to incorporate service territory areas currently not covered in their existing coverage data, as well as request more frequent than annual data updates. This would ensure the models have access to the same information as the rest of San Diego County and are up to date during a red flag warning event.	Severity Level: Low – models run on data which has not been recently refreshed or on imputed data based on mean values may provide inaccurate outputs. This may cause a model to under-represent the potential consequence of an ignition due to a missing at-risk land use.	2028	Not Started
R4.3	Model Improvement Limitations	Do not develop or incorporate additional features to the models. Due to the time pressures and resource constraints, the team does not have the capacity to further improve models in this manner.	Severity Level: Low – impact would be minimal due to the models' existing satisfactory performance but might represent a missed opportunity for continued model improvements and enhancement.	2028	In Progress
R4.4	Safety Weights Documentation	Create a documented framework to define the safety weights used in the PSPS model such that there is an explainable process through which they may be assessed and updated based on additional subject matter expertise. These weights must also be integrated into version control, so that changes are managed and easily tracked, model version to model version. This	Severity Level: Low – without a clearly documented process for suggesting changes to the weights and version control to track those changes, it may be difficult to provide explanatory evidence in	2026	Not Started

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		documentation would help future model developers and users better understand why certain values were used and what the historical justifications and rationale were.	support of decisions driven by this model.		
R5.1	Class Imbalance Approaches	Test other approaches to handling class imbalanced data, including up-sampling, SMOTE, and ADASYN, in order to determine the most applicable method for each model.	Severity Level: Medium – down-sampling excludes significant amounts of data which may result in an unrepresentative data sample being used for training and testing the model.	2026	In Progress
R5.2	Algorithm Testing	Test other algorithms to ensure that the most suitable algorithm is used to solve the problem, balancing complexity of understanding and training with accuracy of modeling outputs.	Severity Level: Low – without validating that there isn't a more suitable algorithm for the model, the team cannot be certain that they have built the most suitable model for the specific application.	2028	In Progress
R5.3	Collaborative Model Development and Release	Implement a more collaborative approach towards model development and release. A peer-reviewed approval process (similar to the one used by WiNGS-Planning) can ensure consistency between sub-models and that best practices are followed.	Severity Level: Medium – individual working may lead to inconsistencies between models, resulting in deployment of models with differing levels of robustness.	2026	In Progress
R5.4	Conductor Model Retrain	Retrain the conductor model based on data from 2015 to present, utilizing the 2022 data for testing and validation. This will ensure the most representative data is utilized in construction and training to create the most accurate and useful modeling outputs.	Severity Level: Medium – based on the most recent data used for validation, the model under-represented the potential risk due to conductor failure. Re-training this model would generate a more representative output.	2026 ~~2025~~	In progress ~~Complete~~
R5.5	Same Data Sources	Train the models on the same data sources that would be utilized for inference in production such that the resulting outputs are most relevant and applicable.	Severity Level: Medium – as the models were trained on different source data, the learned data relationships may not be representative of what would be seen in the EOC. As a result, outputs of the models may not be as accurate as if the data used for	2027 ~~2026~~	Not Started ~~In Progress~~

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
			training was the same source as used in inference.		
R5.6	GIS Cleaning	Consider a larger program of GIS data cleaning, validating, and improvement and investigate if existing GIS red lining processes can be leveraged to ensure the GIS system of record for assets represents the most accurate view of assets in the service territory. This would ensure that any modeling application or activation event would consider that most accurate understanding when making data-driven decisions.	Severity Level: Low – it is critical that decisions in the EOC are made based upon the most accurate representation of the assets in the field.	2028	Not Started ~~In progress~~
R5.7	Hyper-parameter Tuning	Implement the approach used for tuning hyper-parameters in the foreign object model, GridSearchCV, for tuning hyper-parameters in the vehicle contact model.	Severity Level: Low – consistent use of techniques across models ensures that the quality and robustness of each model is uniform and contributes to an optimal output.	2026	Not Started
R5.8	SHAP	Incorporate Shapley Additive Explanations (SHAP) to help explain model outputs through calculating the contribution of each feature to the model output. These values can be used to understand the importance of each feature and to explain the results of the model.	Severity Level: Low – without a full understanding of the importance and contribution of the features in a model, the driving factors of the model's outputs are less explainable.	2023	Complete
R6.1	Brier Score	Use the full Brier score such that the outputs are unaffected by population size. This will enable Brier scores to be compared across different versions of a model to allow model improvements to be validated.	Severity Level: Low – a modified Brier score might be inadvertently used to compare models with different sample sizes. This would give an inaccurate view of the performance comparison and could result in an incorrect modeling decision.	2027 ~~2026~~	Not Started
R6.2	Class Imbalance Validation Methodology	For the vehicle contact model, incorporate a nested cross validation where one fold is an out-of-period imbalanced data split for the final validation and the other fold is split for training and testing on balanced sampled data set. This would provide an additional method for validating the accuracy of the model. Ensure the right metric is used for the evaluation, as	Severity Level: Medium – validating imbalanced data with this approach checks performance of the model against real class distribution.	2027 ~~2026~~	Not Started

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		some metrics are better for evaluation when there is class balance (ROC AUC) and others are better for when there is class imbalance (Precision-Recall AUC).			
R6.3	Uniform Model Testing	Establish a consistent and agreed approach for model testing across the team such that each member may be sure of the optimal model and be in agreement when training is complete. This will ensure consistency across models and build credibility with the end users.	Severity Level: Low – models may have differing levels of robustness without a uniform, defined, and agreed upon approach to testing.	2026	In Progress
R6.4	Data Documentation	Provide detailed documentation for all data that is ingested into the models The documentation is the responsibility of the data owners and should contain pertinent information such as the data owner, data collection methodology, data dictionary, structure of the data, data validation and quality assurance steps taken, data manipulations from the raw data, and confidentiality, access and use conditions. This will ensure a detailed understanding of the data that can be reference as needed, critical for ground truth data.	Severity Level: Low – without detailed documentation, there is a risk the data can be misinterpreted, or if there is turnover or new hires on the WiNGS-Ops Data Science or Advanced Analytics teams, they may have a more challenging time referencing and understanding the data inputs.	2026	In Progress
R7.1	Back-casting Model Validation Process	Create a more holistic and reliable model validation process to allow automated back-casting for each model change. This would allow for greater confidence in the updated version of each model. Given the snapshots of data are now maintained in the cloud, this ensures that this process would be simpler to perform.	Severity Level: Low – without an automated and uniform approach to model output validation, validating each new model release will be a time-consuming and inconsistent process.	2026	In Progress
R7.2	Back-casting Data Capture	Ensure that all necessary data and calculation components are captured, including the network configuration, at the time of a PSPS activation to help streamline future back-casting exercises.	Severity Level: Low – implementing this would allow for the automated and uniform approach mentioned in R7.1 and could be enacted for model back-casting.	2028	In Progress
R7.3	End User Formalized Validation Process	Establish a formalized validation process by the end users that will establish consistency in the validation approach and also build credibility with OEIS by demonstrating the results are reviewed in a specific and systematic way.	Severity Level: Low – without a formalized validation process, there is the potential for end users to validate the model differently every time a new model version is released. This may result in missing an	2026	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
			important check, or reviewing an output that differs from a previous model version.		
R8.1	Centralize Models	Migrate the conductor training model and PSPS model scripts to Azure DevOps Repos. This will ensure development on local machines are version controlled, tracked appropriately, and accessible by the team. This will also allow models to leverage cloud compute capabilities, meaning that more advanced models may be produced. Additionally, the PSPS model should be passed to the inference team such that the entire WiNGS-Ops model can be executed through the inference pipeline.	Severity Level: Medium – current processes limiting version control and access could introduce errors and confusion in the correct version that should be run in production. Full cloud migration would limit the risk of this issue.	2027 ~~2026~~	In Progress
R8.2	Model Training Process Explanation	The model training team should provide a more thorough explanation of the model training process and decisions which would enable the Advanced Analytics team to have a better grounding for implementing the code. As well as education sessions, thorough documentation would enable any new team members to be onboarded swiftly.	Severity Level: Low – without full understanding and knowledge of the model training process, the Advanced Analytics team may not be able to add as much value in critiquing and improving the models.	2023	Complete
R8.3	Combine Pole and Span Ignition Models	Combine the pole and span ignition models to remove any overlaps which might exist.	Severity Level: Medium – currently the models are not fully independent, which may skew the results. This should be rectified such that an accurate representation of risk may be generated.	2025	Complete
R8.4	Profiler	Run a profiler to help understand the resource consumption of the various operations in the model. This can potentially resolve performance bottlenecks and help the model execute faster.	Severity Level: Low – this recommendation does not affect the model output but may improve the runtime performance of the model.	2027 ~~2026~~	In Progress
R8.5	Unit Testing	Incorporate unit testing to ensure all functions are performing as intended and errors are more easily isolated when they occur. Unit tests also check that the code still functions as expected after making changes, which builds code stability.	Severity Level: Medium – Without unit testing, there is no assurance that the code will function correctly and that there are no undiscovered bugs. This can lead to poor quality modeling results and	2027 ~~2026~~	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
			wasted time and resources spent debugging.		
R8.6	Integration Testing	Incorporate integration testing to ensure all functions and scripts are working together as intended and there are no conflicts or errors between different code units.	Severity Level: Medium – without integration testing, there is no assurance that all functions and scripts are working together correctly. In addition, the team will be less efficient at debugging and will spend time and resources fixing errors.	2023	Complete
R8.7	Docstrings	Ensure all python functions have docstrings, which will ensure that all functions are correctly documented and definitions, descriptions, and decision point reasoning are captured. Docstring best practice for a function includes a brief description of what the function is and what it is used for, any arguments that are passed, labeling what is required and what is optional, and determining any restrictions on when the function can be called or any exceptions that are raised.	Severity Level: Low – this recommendation will not affect the model outputs but is a best practice to follow when writing code.	2028	In Progress
R9.1	Internal Resources Embedded into Each Team	Ensure there is a skilled and knowledgeable base of internal resources involved in each aspect of the WiNGS-Ops modeling process such that reliance on external parties is reduced.	Severity Level: Low – the Advanced Analytics team is skilled and knowledgeable so there is minimal risk to the model outputs at this stage.	2027 ~~2026~~	In Progress
R9.2	Cloud Consolidation	Consolidate services under one cloud provider for ease of use, integration, and billing. This can ensure that future updates to any of the cloud services are always made in a way to keep compatibility and seamless integration with the other developed components.	Severity Level: Low – this recommendation has no impact on the output of the WiNGS-Ops model but would allow for greater efficiency in use of cloud services. Although cloud services may work together across different vendors, they are optimized to work most effectively when combined with services belonging to one single cloud provider.	2028	Not Started

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
R9.3	Pipeline Deployment Documentation	Create robust and granular documentation of the deployment pipeline, which would ensure a lower reliance on the experience of resources.	Severity Level: Medium – without this documentation, a continued reliance on external resources would be mandatory as there would be no straightforward mechanism through which internal resources could inform themselves on the finer details of the inference pipeline.	2027 ~~2026~~	In Progress
R9.4	Modeling Key Drivers	Expose key drivers of the modeling output to the users, such that they may gain a greater understanding of the outputs and some indication on how an output should be viewed and utilized.	Severity Level: Low – this detail may allow for greater understanding and trust in the WiNGS-Ops output.	2026	In Progress
R9.5	Limitations Documentations	Document the limitations of the models that underpin the WiNGS-Ops outputs and ensure that these are fully understood by the business users. This will ensure that any decisions made based on the result of the WiNGS-Ops model are made from the most informed position.	Severity Level: Medium – without understanding the limitations of the model, sub-optimal decisions may be made due to a misinterpretation of the results.	2026	In Progress
R9.6	Full Model Lifecycle Documentation	Document the full lifecycle of each model in training and in inference such that the knowledge, skills and experience of the team is captured for future use. This would also enable training and onboarding of new resources to be more straightforward and regulatory filings to be completed more swiftly. Example pieces to include in this documentation are the problem formulation process, all decision points and reasonings, and future plans and intentions.	Severity Level: Low – the team is knowledgeable in the models they have constructed so any risk is reduced. In most cases there is only one team member with discrete knowledge of the specific model.	2027 ~~2026~~	In Progress
R9.7	Weather Sanitization Ownership Update	Update the technical ownership of the weather sanitization repository and any other repositories that may have changed ownership.	Severity Level: Medium – the script is well understood by multiple parties, however there is no single owner to drive decisions or improvements.	2026 ~~2025~~	In Progress ~~Complete~~
R9.8	Weather Station Imputation Mapping	On the inference side, implement the device to weather station associations that the Meteorology team determined based on topographical features into the weather station mapping. This will	Severity Level: Medium – there is the potential to produce skewed results if there is a	2026	In Progress

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		ensure the most suitable weather station data is used for each segment.	significant topographical impact on certain spans.		
R9.9	Missing Data Outputs	Correct data issues such that all segments have an outputted value from the WiNGS-Ops model. Failing that, provide full communication and explanation to the end users for those segments where a WiNGS-Ops output was unable to be generated. This would ensure that awareness of these missing values is gained and decisions are not based on the omission of those segments in the model outputs.	Severity Level: Medium – while the PSPS de-energization decision takes other inputs aside from WiNGS-Ops, without a complete model output for every segment, it is conceivable that the decision maker will lose trust with WiNGS-Ops model if a PSPS de-energization decision would need to be made for a segment that has no WiNGS-Ops output.	2026	In Progress
R9.10	Cold Storage	Consider the use of cold storage for long-term storage of snapshots or model runs which do not need to be accessed regularly. This would reduce the overall costs of the cloud infrastructure, which will become more important as the models and data sets mature and grow in size.	Severity Level: Low – as the size of files being stored currently is not large, use of cold storage would have a minimal effect on the cost of cloud services, though remains a best practice recommendation.	2028	Not Started
R9.11	Error Monitoring Dashboard	Develop a monitoring dashboard that provides real-time error monitoring and a view of the model runs such that issues may be highlighted and resolved in a timely manner.	Severity Level: Low – existing monitoring allow for errors to be identified; however, advanced monitoring would allow a more streamlined process for error identification and remediation.	2026 ~~2025~~	In Progress ~~Complete~~
R9.12	Global ID Cleaning	Clean the data such that all Global IDs are valid and the amount of feeders without output results due to invalid global IDs decreases. This will prevent situations where the WiNGS-Ops model is unable to produce risk scores.	Severity Level: Medium – having up to 10% of feeders without risk scores could cause a loss of credibility within the organization when the model is needed to provide data driven insights for PSPS de-energization decision making.	2026 ~~2025~~	In Progress ~~Complete~~
R9.13	WiNGS-Ops Support Position	Create a new role in the EOC to provide WiNGS-Ops model support. This person would be knowledgeable about all aspects of the model, outputs,	Severity Level: Low – without this role in the EOC, the model may not be fully understood so	2023	Complete

ID	Recommendation Name	Description	Severity Level	Target Deadline (EOY)	Status
		limitations, and the impact on other components utilized in EOC decision-making.	model outputs may be interpreted incorrectly. This could lead to sub-optimal decisions being made.		
R10.1	Issue Reporting Process	Create a formalized process for issue reporting from the end users to the development teams. This should be simple and streamlined such that any issues may be raised, quantified, and remediated quickly.	Severity Level: Low – currently there is no prescribed process, which could lead to confusion as to the point of escalation for issues. This may result in a delay to any remediation activity and impact the quality of outputs.	2026 ~~2024~~	In Progress ~~Complete~~
R10.2	Action & Tasks Log	Document meetings and create a backlog for actions/tasks so they can be prioritized, tracked, and completed against. This will ensure that all tasks are captured and implemented as intended and miscommunication is avoided.	Severity Level: Low – without a formalized process of documentation and action tracking, there may be more instances of misunderstanding of intention between teams, which might result in a sub-optimal outcome or re-work in remediating the concern.	2027 ~~2025~~	In Progress ~~Complete~~
R10.3	Questions and Model Changes Tracking	Create a formalized process for questions and model changes ahead of each activation event. In addition, track changes to model code and outputs through formal version control. This will mean that the decision points and actions taken are formally documented and easily explainable if a reference is required, which may aid answering regulatory questions or post-event report preparation.	Severity Level: Low – the current process will result in a more time-consuming post-activation event reporting process. This may mean a period of potential re-work to establish the reasoning behind certain tweaks and decisions taken in the model pre-event.	2027 ~~2025~~	In Progress ~~Complete~~
R10.4	WiNGS-Ops Overall Versioning Process	Create an overall WiNGS-Ops model versioning process such that changes or updates to any component of WiNGS-Ops results in a version iteration. This ensures that users have a clear indication of when a model methodology has changed. This may help the users understand which models may be easily compared.	Severity Level: Low – the current versioning methodology may result in inaccurate comparisons being made by end users across models.	2027 ~~2025~~	In Progress ~~Complete~~

05 (see SDG&E's 2026-2028 Wildfire Mitigation Plan, Appendix D). When combining mitigations, the following formula was used (in collaboration with the Joint Utilities):

$$Combined\ Effectiveness = 1 - [(1 - CC\ Efficacy) \times (1 - FCP\ Efficacy) \times (1 - EFD\ Efficacy)]$$

$$1 - [(1 - 46\ \sout{44}\%)] \times (1 - 8\%) \times (1 - 16\%) = 58\ \sout{56.7}\%$$

The overall efficacy of CC conductors is estimated to be 46 ~~44~~ percent and the overall efficacy of CC combined with FCP and EFD is estimated to be 58 ~~56.7~~ percent.

Explanations of the calculations, a list of assumptions, and justifications for each assumption for wildfire and outage program risk reductions can be found here:

https://www.sdge.com/2026-2028-wildfire-mitigation-plan

~~https://www.sdge.com/2026-wildfire-mitigation-plan~~