



FINAL REPORT

Independent Review of Wildfire Mitigation Plan

City of Shasta Lake

May 13, 2020

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Further, certain statements, findings and conclusions in this Report are based on Siemens EBA's interpretations of various contracts. Interpretations of these contracts by legal counsel or a jurisdictional body could differ.

1. Executive Summary

In response to Senate Bill (SB) 901 signed into law on September 21, 2018, The City of Shasta Lake (“the City”) engaged Siemens Industry, Inc. (“Siemens”) as the independent evaluator of its wildfire mitigation plan (WMP). SB 901 was codified into the California Public Utilities Code (PUC) Section 8387 for publicly owned utilities. In addition, the California PUC was updated on July 12, 2019 by assembly bill (AB) 1054, which created the California Wildfire Safety Advisory Board to advise and oversee wildfire mitigation plans.

Siemens was retained by the City to be the qualified independent evaluator of the WMP as stipulated under PUC Section 8387(c). As a result of the independent evaluation, this report was created and includes the following sections:

- Independent review requirements and approach
- Comprehensiveness review including:
 - Statutory compliance review
 - Capability maturity model analysis
- Summary of review results and WMP enhancement recommendations
- Appendices

The Siemens consulting team deems the City’s wildfire mitigation plan to be comprehensive and complete and finds that the plan fulfills all requirements of the California PUC Section 8387.

The consultant team has listed recommendations in [Section 4.3](#) for recommended enhancements to future WMP versions.

2. Independent Review Requirements and Approach

2.1 Legislative Requirements

2.1.1 Senate Bill 901

On August 31, 2018, the California Legislature passed Senate Bill (SB) 901 that requires electric utilities to prepare a WMP that should include each utility's strategies, protocols, and programs for wildfire mitigation and response. SB 901 requires each electric utility to prepare a WMP before January 1, 2020. The Public Utilities Code was consequently updated, and the requirements for publicly owned utilities were reflected in PUC Section 8387.

2.1.2 Assembly Bill 1054

Assembly Bill (AB) 1054 was passed by California's state legislature upon findings and recommendations from the SB 901 Commission. AB 1054 establishes the State's Wildfire Safety Advisory Board to advise the Wildfire Safety Division at the California PUC. Publicly owned utilities shall submit their WMPs to the Wildfire Safety Advisory Board for review and recommendations by July 1 of each year starting in 2020. Publicly owned utilities are required to update their WMPs at least once every three years.

2.2 Independent Evaluator Approach

On November 5, 2019, the City Council adopted the First Annual WMP as required under SB 901.

Siemens was then retained by the City to be the qualified independent evaluator of the WMP as stipulated under PUC Section 8387(c). Siemens reviewed the plan in its entirety for comprehensiveness, including a statutory compliance review against the PUC Section 8387 requirements (see [Section 3.1](#) and Appendix A) and a maturity analysis using a capability maturity model (CMM) framework (see [Section 3.2](#) and Appendix B).

During the review, the Siemens team drew upon their knowledge of industry best practices in wildfire prevention and mitigation currently employed by peer utilities. The review results and recommendations were discussed with City Electrical Department staff and management and documented in this report (see [Section 4](#) for summary).

2.3 Independent Review Consultant Qualifications

Siemens conducted the WMP evaluation through its Power Technologies International ("PTI") Energy Business Advisory ("EBA") consulting group. Siemens PTI EBA's focus was on identifying

and managing ignition point risks across the City's transmission and distribution resources. The assigned team provided expertise in operations, maintenance practices, vegetation management practices and standards, root cause analysis and risk management, regulatory requirements, compliance, and operational audits.

Siemens is a global energy business with 380,000 employees worldwide, providing a comprehensive range of power equipment, information systems, and services. Siemens has provided risk management services to the U.S. power industry for over twenty years. A sample list of prior projects is provided in [Appendix C](#).

3. Comprehensiveness Review

Siemens performed a rigorous independent evaluation which included a statutory compliance review and a WMP maturity analysis. Siemens found the City's WMP to be comprehensive and compliant with the statutes established through SB 901 and California PUC Section 8387. The results of the independent evaluation are discussed in this section.

3.1 Statutory Compliance Review

3.1.1 WMP Content Requirement

PUC 8387(b).2 outlines the necessary WMP components for publicly owned utilities. Each PUC requirement was reviewed against the City's WMP to determine compliance and comprehensiveness.

The City's WMP contains the following sections, which are referenced throughout this report:

- I. Overview
- II. Objectives of the Wildfire Mitigation Plan
- III. Roles and Responsibilities
- IV. Wildfire Risks and Drivers
- V. Wildfire Preventative Strategies
- VI. Community Outreach and Public Awareness
- VII. Restoration of Service
- VIII. Evaluating of the Plan
- IX. Independent Auditor

The following headings each address a required WMP component and the description that follows provides evidence of how the City met each requirement in its WMP.

See Appendix A for a summary table of the compliance review results presented below.

Responsible Parties – PUC 8387(b).2.A

The WMP must include the roles and responsibilities of all persons involved in executing the WMP.

The City's WMP Section III.A outlines the roles relevant to executing the WMP and the responsibilities under normal operation and emergency response. An organization chart, job descriptions and general responsibilities for the following roles are included: City Council, City Manager, Finance Director, Electric Utility Director, Assistant Electric Director, and Electric Operations Manager. The Electric Department's responsibilities related to fire prevention, response and investigation are also listed.

Program Objectives – PUC 8387(b).2.B

The WMP must include the plan's objectives.

WMP Section II lists the three main objectives and includes a short description of each goal and the City's actions to meet the criteria. The objectives given are:

- Minimize ignition sources (and the probability that the City will be original or contributing source of a wildfire)
- Improve resiliency of the electric grid
- Minimize unnecessary or ineffective actions (by measuring mitigation strategies' effectiveness)

Preventative Strategies – PUC 8387(b).2.C

The WMP must include a description of the City's preventative strategies and programs used to minimize the risk of its electrical lines and equipment starting a wildfire.

WMP Section V reviews the City's preventative strategies. The eight subsections each describe a different method. The program and strategies discussed are:

- directly participating in CPUC's fire-threat map development.
- situation awareness through monitoring of weather and weather-based operating conditions (normal vs. extreme fire-risk).
- meeting or exceeding relevant federal, state, or industry standards in facility design and construction (e.g. CPUC General Order 95 guidelines, National Electric Code standards).
- maintaining a comprehensive Vegetation Management Plan (VMP).
- maintaining a comprehensive Asset Inspection Plan (AIP).
- implementing workforce training on the WMP content and other fire safety procedures.
- disabling automatic reclosing functions during high fire risk seasons.
- providing an emergency system de-energization policy.

Performance Metrics – PUC 8387(b).2.D

The WMP must describe the metrics used to evaluate performance, including any assumptions.

WMP Section VIII.A describes the two metrics that the City will use to measure the WMP's performance:

- Number of fire ignitions
- Number of wires down within the City's service territory

The WMP gives the definitions of a "fire ignition" and "wires downed" and discusses the underlying assumptions for each. It also describes how the two metrics will be classified and tracked.

A WMP Performance Report document will be used to annually report on metrics and maintain records. The report will document each metric and include supplemental event descriptions for fire ignitions that cause fires greater than 10 acres and any unusual wires-downed events.

Previously Utilized Metrics – PUC 8387(b).2.E

The WMP must discuss how past performance metrics have informed and shaped the plan.

WMP Section VIII.B states that the City will use the metric data gathered in the initial years of the WMP to modify future versions. Due to the lack of historical data, there is no discussion on the application of metrics in the first annual WMP. The City's intends to modify the WMP in future years based on the gathered data.

Recloser and De-Energizing Protocols – PUC 8387(b).2.F

The WMP must include protocols for disabling reclosers and deenergizing the electrical system and mitigating the public safety impacts of those protocols.

WMP Section V.G states the City's recloser policy in which they disable automatic reclosing on all substation and field reclosers from May 1st through November 30th, or as otherwise determined by the Electric Director.

WMP Section V.H states the City's de-energization policy, provides justification for the policy, and discusses the public safety impacts. The City deenergizes their system when directed by local authorities but does not proactively deenergize due to its potential impact on the City's water supply. The impact on Law Enforcement and Fire Response agencies is also considered and discussed.

Customer Notification Procedures – PUC 8387(b).2.G

The WMP should include procedures for notifying customers impacted by system de-energization.

WMP Section V.H.2 discusses the customer notification protocols for outages. For planned outages, impacted customers are notified by phone, email, or in person prior to an outage. For unplanned outages, the City's social media and website communication platforms are used to provide customers updates.

Vegetation Management Plans – PUC 8387(b).2.H

The WMP must include the City's plans for vegetation management.

WMP Section V.D lists vegetation management as a preventative strategy. The section states that the Electric Department maintains a vegetation management plan (VMP) and ensures the VMP meets or exceeds the following industry standards and practices: Public Resources Code section 4292 and 4293, GO 95 Rule 35, and GO 95 Appendix E Guidelines to Rule 35.

The City's VMP policy document was provided and reviewed as part of this third-party evaluation. The VMP was found to be comprehensive and the procedures were well documented.

Electrical Line and Equipment Inspection Effectiveness Plan – PUC 8387(b).2.I

The WMP must include the City's plans for electrical infrastructure inspections.

WMP Section V.E lists inspections as a preventative strategy. This section states that the Electric Department maintains an asset inspection plan (AIP) for the inspection and maintenance of the City-owned assets and ensures the AIP meets or exceeds the following industry standards and practices: CPUC GO 165 and CPUC GO 95, Rule 18.

The City's AIP policy document was provided and reviewed as part of this third-party evaluation. The AIP was found to be comprehensive and well-documented.

Identification and Prioritization of Wildfire Risk – PUC 8387(b).2.J

The WMP should identify, describe, and prioritize all wildfire risks in its service territory.

WMP Section IV lists the City's main wildfire risk drivers which focus on topographic and climatological factors that impact their service territory and the operation and maintenance of their electric grid.

This WMP identifies a list of conditions which can create higher risk of wildfire but lacks a documented process and discussion identifying and prioritizing the listed risks. However, there is evidence that the City has identified and prioritized its wildfire risks because the operational and maintenance mitigation actions summarized in this review report demonstrate an understanding and prioritization of wildfire risks and effective mitigation strategies. In a future version of the plan, the risk analysis and prioritization process should be documented to ensure the process is understood, transparent, sustainable, and continuously improved. The evidence demonstrating risks were identified, prioritized and effectively mitigated is discussed with more detail in [Section 3.2 – ID and Prioritization of Wildfire Risks](#) of this report.

Higher Wildfire Risk Areas – PUC 8387(b).2.K

The WMP must identify any geographic areas at higher wildfire risk than identified in the commission fire threat map, and where the commission should expand a high fire-threat district.

WMP Section IV.C addresses changes to the California PUC statewide Fire Threat Map. Currently, the City does not recommend any changes to the Fire Threat Map. The City directly participated in the map development and will continue to coordinate with local fire officials to evaluate the map and expand the high fire-threat districts as identified. The City states that any future changes in knowledge or recommendations will be communicated.

Enterprise-Wide Risk – PUC 8387(b).2.L

The WMP must include a methodology for identifying and presenting enterprise-wide risks.

WMP Section IV.B states that the City will use a methodology to address and mitigate enterprise-wide safety risks. The City's key enterprise-wide risks and conditions are listed in this section, as result of their analysis. The City asserts they will identify and manage any risks that arise from the listed conditions.

The methodology and procedures for identifying and addressing the risks are not explicitly documented. However, there is supporting evidence in the WMP that a process and the necessary structures are in place to manage enterprise-wide risk. This evidence is discussed with more detail in [Section 3.2 – Integration with Enterprise-wise Risk](#) of this report.

Damage Restoration Plan – PUC 8387(b).2.M

The WMP must include a statement on how the City will restore service after a wildfire event.

WMP Section VII gives the City's statement on their service restoration protocols and details a phased approach for restoring power. The restoration protocol states that a circuit must be manually inspected before restoring power. This protocol generally remains the same regardless of the outage's root cause and minimizes the risk of prematurely re-energizing the impacted system circuit.

Monitoring and Audit Plan – PUC 8387(b).2.N

The WMP must describe the City's processes to monitor and audit the WMP, identify and correct any deficiencies in the WMP and its implementation, and monitor and audit inspection effectiveness.

WMP Section VIII describes the City's monitoring and audit process for the WMP and inspections. Metrics and unusual events will be documented in an annual WMP Performance Report. The annual findings will be analyzed and used to correct any deficiencies and proactively improve upon existing policies. For inspections, the City will use General Orders (GO) 95 and 165 to guide its process and document inspections in its maintenance software ("Partner") for monitoring and audits.

3.1.2 Public Presentation of Plan

PUC 8387(b).3 requires publicly owned utilities to submit and present its WMP in a public meeting on or before January 1, 2020. While this requirement is out of the Siemens independent evaluation scope, it was confirmed that the City presented the WMP at a public City Council meeting on November 5, 2019.

3.1.3 Independent Evaluation of Plan

PUC 8387(c) requires publicly owned utilities to obtain an Independent Evaluation (IE) of their WMP and the evaluator to present their report findings in a public meeting.

Siemens completed an independent evaluation of the City's Electric Department Wildfire Mitigation Plan on or before June 3, 2020 pursuant to the requirements of PUC 8387(c). Upon submission of the final report, a Siemens representative shall present the report findings at a regularly scheduled meeting of the City Council, which is anticipated to be on or before June 3, 2020.

3.2 Capability Maturity Model Analysis

Siemens performed another evaluation using a Capability Maturity Model (CMM) framework to assess the City's WMP against industry best practices. This was done in supplement to the compliance comprehensiveness review. The results discussed in this sub-section are not measured as "compliant" or "noncompliant" to any of the WMP required content. However, several outcomes evaluated in the maturity model provide evidence that can be used to support a compliance determination, such as risk analysis and prioritization process and enterprise risk management methods.

The CMM framework has seventeen (17) categories, including thirteen (13) statutory requirements (reviewed in [Section 3.1](#)) and four (4) additional items. The WMP was evaluated in each category and assigned a score based on its comparison to the City's industry peer group (see Exhibit 1). As an outcome of this assessment, the City will have a roadmap of how to improve their WMP and strengthen their risk mitigation actions.

Exhibit 1. CMM Scoring Key

| Scoring Key | Interpretation |
|-------------|------------------------|
| 1-3 | Good to Best Practice |
| 4-6 | Consider Improvement |
| 7-9 | Improvement Vital |
| >=10 | Unacceptable |
| | Additional to PUC 8387 |

From the CMM analysis, Siemens found the City's WMP to exceed expectations in many categories when compared with other small municipal and cooperatives utilities. The WMP scored "Good to Best Practice" for eleven (11) categories, five (5) areas were highlighted for the City to "Consider Improvement" and one (1) CMM category was marked as "Improvement Vital" to meet and exceed industry standards.

The following describes the assigned scores for each CMM category and provides evidence for the assessment. See Appendix B for a summary table of the results presented in this section.

Responsible Parties

A CMM score of 4 was assigned indicating that the City should consider improvement to meet best practices.

The City's general roles and responsibilities were included in the WMP, along with a list of fire-related responsibilities assigned to the Electric Department. Siemens recommends that more granular wildfire responsibilities are included with individual roles assigned to each responsible position. Responsibility descriptions should enable action and accountability.

Program Objectives

A CMM score of 3 was assigned indicating that the current WMP version is within good to best practice.

The WMP lists and discusses three objectives and considers the actions needed to meet the goals. The objectives should be monitored and updated periodically. There is no further improvement identified at this time.

Preventative Strategies

A CMM score of 2 was assigned indicating that the current WMP version is within good to best practice.

The WMP lists and discusses eight preventative strategies. In particular, the weather monitoring and the vegetation management policies were found to exceed standard industry practices.

The City also provided supplemental evidence that the Electric Department takes a proactive approach to implementing processes and policies in their operations. In 2019, the actions taken by the City to implement and improve upon their preventative strategies included:

- **Weather-based operations:** On days declared Red Flag Warnings by the National Weather Service, the Electric Department operated under "emergency standby" and deferred non-essential work to prioritize line patrols and decrease event response time.
- **Recloser reprogramming:** Automatic reclosing was blocked from May 23 – November 11
- **Proactive system de-energization:** 2 miles of a 12kV circuit was de-energized on two occasions to minimize wildfire risks due to extreme wind events in October.
- **Asset Inspections/Vegetation Management:** 115kv transmission line LiDAR survey was performed on November 21 and resulted in prioritized vegetation trimming schedule and a line rating and condition modeling study.
- **Design and construction standards:** 2 pilot "grid hardening" programs initiated to replace traditional fuses with current-limiting fuses and to install a fast-acting circuit breaker.

These mitigation strategies appear to be effective and directly address wildfire risks affecting the City. For that reason, the City was determined through evidence of positive results to be compliant with the requirement to identify and prioritize risks as outlined in the previous section, although documented risk analysis procedures are lacking at the present time.

The City should continue to adapt policies and strategies as new information becomes available from their continued risk analysis, historical event data collection and cause analysis, and documented lessons learned.

Performance Metrics

A CMM score of 3 was assigned indicating that the current WMP version is within good to best practice.

The two metrics presented in the WMP were quantitative with clear definitions and assumptions documented. Additionally, a process is in place to document the metrics using the Electric Department's annual WMP Performance Report.

The City should collect and monitor the data and use it to improve upon the tracked metrics and overall WMP content. There is no further improvement identified at this time.

Previously Utilized Metrics

A CMM score of 4 was assigned indicating that the City should consider improvement to meet best practices.

Since this was the City's first annual WMP, there is no historical metric data to discuss. The City intends to track and document the metrics through its WMP Performance Report and improve the WMP accordingly.

The next WMP version should report on how the metrics were used to adapt the WMP's content.

Response Coordination

A CMM score of 4 was assigned indicating that the City should consider improvement to meet best practices.

WMP Section III details the general coordination within City departments and with external groups. The coordination between the City's Electrical Department, Water Utilities, and emergency response agencies is particularly strong. During interviews with the Electrical Department, external fire response resources were discussed, and it was shown that the City is proactively seeking to increase their initial response resources to 911 fire calls to further mitigate fires leading to catastrophic wildfires.

Siemens recommends that the WMP include documented details on wildfire-related response coordination and specifics on how the WMP will be implemented during emergency wildfire events.

Recloser and De-energizing Protocols

A CMM score of 2 was assigned indicating that the current WMP version is within good to best practice.

The recloser and de-energization policies described are clear and actionable. Additionally, the City provided evidence of implementation during the independent evaluation interviews. In 2019, the recloser policy was implemented from May 5, 2019 to November 27, 2019 during the high fire threat season. An electric circuit was also proactively deenergized on two separate occasions due to extreme wind events (October 9-11 and October 27-28). This demonstrates a willingness to de-energize when a risk is identified, or authorities advise action.

To continue in best practice, the WMP could include a lesson learned discussion on historical system recloser blocking and de-energization.

Customer Notification Protocols

A CMM score of 3 was assigned indicating that the current WMP version is within good to best practice.

The customer notification protocols meet best practices for a municipally owned utility. The City provided a supplemental Power Outage Communication Policy document and gave evidence that this policy was followed for both system de-energization events discussed under the previous heading.

There is no further improvement identified at this time.

Vegetation Management Plans

A CMM score of 2 was assigned indicating that the current WMP version is within good to best practice.

The City maintains a separate VMP document and states that their program meets all relevant industry standards and guidelines. The following procedures and policies are well documented and were found to exceed requirements.

The City's power lines are inspected and trimmed routinely. The City uses available technology and its knowledge of vegetation to prioritize and maintain trimming schedules that exceed minimum clearance provisions and guidelines. All lines are inspected and trimmed at least once per year and crews are dispatched in emergency or high-risk cases

Additional to the VMP policy, on November 21st, 2019, a LiDAR survey was conducted on the City's 115kv transmission loop. The survey was used to create a list of clearance issues during high-wind conditions, which was used to proactively dispatch crews to trim at risk areas and prevent wildfires

on high-wind days. This shows that the City is using available technology to evaluate its policies and improve its mitigation actions as new data becomes available.

There is no further improvement identified at this time.

Electrical Line and Equipment Inspection Effectiveness Plan

A CMM score of 3 was assigned indicating that the current WMP version is within good to best practice.

The City's maintains a separate Asset Inspection Plan (AIP) policy document and states that their program meets all relevant industry standards and guidelines. Routine and post-maintenance inspections are documented in the City's Distribution Inspection Software (Partner).

There is evidence that the City proactively evaluates its policy and improves its inspection methods as new information becomes available. The Electrical Department performs more frequent inspections on certain areas based on their knowledge of the environmental and geographical conditions. Also, the LiDAR survey discussed above was used to perform a line rating study and model existing line conditions.

From the inspections and collected data, the City initiated two pilot projects to increase grid reliability, including fuse replacements and installing a fast-acting circuit breaker on a known high-risk power line. These enhanced technologies minimize the risk of a flash or spark ignition from utility equipment.

There is no further improvement identified at this time.

ID and Prioritization of Wildfire Risks

A CMM score of 6 was assigned indicating that the City should consider improvement to meet best practices.

The WMP lists six risk factors but the system risks are not explicitly discussed and lack documented evidence of the procedure and process used to identify and prioritize wildfire-related risks. However, the preventative strategies, policies, and operational actions taken the Electric Department provide evidence that the City understands its risks factors, has prioritized the risks based on the system impact, and is taking effective steps to mitigate those risks.

The supporting evidence provided for the City's wildfire risks identification and prioritization include:

- CPUC High Fire Threat Map incorporated into Electric Department operations and practices.
- Power supply to the City's water plant prioritized to mitigate identified risk to water supply.
- Vegetation trimming policy prioritized based on topographical risk factors.
- Weather conditions monitored and operations changed under high-wind conditions.
- Priority given to new fuses and fast-acting circuit breaker installation to minimize identified fire risks in wooded areas or inaccessible areas for vegetation trimming.

- Consideration given to increased initial response for 911 fire calls to mitigate fire spread
- Automatic reclosing disabled on reclosers during high fire threat season.
- LiDAR survey on 115kV line found clearance risks and the City prioritized trimming to the identified line sections.

Siemens recommends that the next WMP clearly documents the methodology and logic behind the identification and prioritization of risks. The City can include a risk analysis section to document this process, as discussed below.

Risk Analysis and Drivers

A CMM score of 7 was assigned indicating that improvement is vital to meet industry standards and best practices.

The WMP does not included an analysis on risks and drivers. While this is supplemental to the PUC 8387 requirements for publicly owned utilities, risk analysis provides a documented method to identify risk factors and drivers, understand risks and system impact, and implement risk mitigation actions.

Siemens recommends that in future WMP versions, a risk analysis section is added to address and document the City's risk identification and risk mitigation plans. Recommended risk analysis components include risk identification, analysis, prioritization, mitigation, and monitoring.

Adequately Sized and Trained Workforce

A CMM score of 3 was assigned indicating that the current WMP version is within good to best practice.

The WMP discusses a workforce training program implemented by the Electric Department. A workforce training program is supplemental to the PUC 8387 requirements for publicly owned utilities. The department's training includes the WMP's content, proper use of fire extinguishers, and briefings on potential ignitions, environmental conditions, and other safety procedures.

There is no further improvement identified at this time.

Integration with Enterprise-wide Risk

A CMM score of 4 was assigned indicating that the City should consider improvement to meet best practices.

The WMP does not explicitly document a methodology for identifying and addressing enterprise-wide risks. However, the WMP gives supporting evidence that there are processes and necessary structures in place to manage the City's enterprise-wide risk. This qualitative evidence includes:

- City's reporting hierarchy (WMP Section III.A)
- City's internal communication coordination protocols (WMP Section III.B)

- Electric Department's emergency communication to impacted enterprises (WMP Section III.B)
- City's understanding of critical infrastructure interdependencies (WMP Section III.B)
- Discussion and analysis of past events' impact on City-wide facilities (WMP Section III.B)
- Preventative actions to minimize power outage risks to City's water supply (WMP Section III.B)
- Standardized Emergency Management System (SEMS) structure for external communication obligations and emergency planning (WMP Section III.D)
- Shasta County Sheriff's Office of Emergency Services (OES) coordination (WMP Section III.D)
- Communication between regional utilities during emergency events (WMP Section III.D)

Siemens recommends that the next WMP clearly documents the methodology and structures behind addressing and presenting enterprise-wide risks.

Damage Restoration Plan

A CMM score of 3 was assigned indicating that the current WMP version is within good to best practice.

The City acts in a conservative manner and does not restore power to a system circuit until there has been manual inspections of the affected portions and any suspect equipment. This minimizes the risk of energizing a system that could potentially be an ignition point and impact the system on a wider scale. The City also uses its SCADA and AMI system to monitor the system's performance during this process.

Siemens recommends that a step-by-step restoration process is documented and referenced in the next WMP, with focus on restoration after a wildfire event.

Monitoring and Audit Plan for WMP

A CMM score of 3 was assigned indicating that the current WMP version is within good to best practice.

The City has multiple checkpoints and processes in place to monitor and audit its WMP. The WMP undergoes an annual review by the City Council. The Electrical Department documents metrics in an annual WMP Performance Report to measure the WMP's effectiveness. Per PUC 8387(c) requirements, the City will also contract with an independent evaluator to audit the WMP and present findings.

The City should incorporate learnings from its monitoring and audit process into future WMP versions. There is no further improvement identified at this time.

Deficiency ID and Correction Plan

A CMM score of 3 was assigned indicating that the current WMP version is within good to best practice.

The City aims to use its monitoring and audit activities to identify deficiencies and continually improve upon policies and procedures. The Electric Director is responsible to present and correct any deficiencies and improvements to the City Council. In 2019, the City demonstrated their commitment to correct and improve their WMP policies and procedures, including:

- Adapting vegetation management schedules based on LiDAR survey results
- Improving de-energization plan to proactively de-energize system under high-wind conditions
- Implementing a new fault location software add-in on its asset management software to focus line patrols and reduce outage times
- Initiating pilot projects to correct known system reliability issues (fuse replacements and fast-action circuit breaker installation)

There is no further improvement identified at this time.

4. Results

The independent evaluation of the City of Shasta Lake's first Annual Wildfire Mitigation Plan found it to be compliant with SB 901 and PUC 8387 requirements, and in many areas the City's WMP exceeded requirements. In summary, the WMP's strengths and areas for improvement are listed below along with the final Siemens recommendations and independent evaluation conclusions.

4.1 Plan Strengths

The evaluation of the City's WMP against statutory and regulatory requirements and the maturity model framework revealed several strength areas. Many of the City's policies and procedures exceeded expectations for a smaller municipally owned utility and the supporting evidence collected highlighted the City's commitment to uphold the WMP requirements.

The areas of strengths that stood out during the WMP evaluation were:

- Identification of the City's critical infrastructure interdependencies
- Response coordination and communication within and external to City
- Standardized emergency management communications and relationships
- Staff's situational awareness of weather conditions and fire danger
- Operational risk mitigation strategies deployed during severe wildfire risk conditions
 - Deferring live line work
 - Deploying fire suppression teams and equipment
 - Deferring non-essential work to prioritize line patrols and event response time
- City's Vegetation Management Plan, including the frequency of trimmings and how knowledge of the system and vegetation types is used and exceeds standards and guidelines
- City's Asset Inspection Plan, including the inspection frequency and the software package used for systematic tracking of work
- Recloser policy that blocks automatic reclosing during high fire-threat season
- Objective metrics with annual WMP Performance Report template for incident reporting

4.2 Plan Improvements

No compliance deficiencies were identified during the evaluation, but Siemens found that the overall risk analysis process and documentation could be improved upon in future WMP revisions. This includes the identification and prioritization of wildfire risks, the analysis of risks and their impacts, and the enterprise-wide risk methodology.

4.3 Conclusion and Recommendations

After completing the Independent Evaluation, Siemens found that the City's WMP conforms to all PUC 8387 provisions.

In future WMP revisions, Siemens recommends that the City consider the following enhancements:

- Add more detail on wildfire mitigation responsibilities.
- Continue to annually monitor and update WMP objectives.
- Proactively adapt preventative strategies and policies as new information and technology become available.
- Monitor and analyze the documented metrics and use the trends and lessons learned to improve upon future WMP policies and event responses.
- Add details of WMP-specific response coordination.
- Document historic wildfire-related event details and their response coordination.
- Maintain historical data on event cause analysis and trends.
- Include a lessons-learned discussion on historical events and use to adapt WMP protocols.
- Consider risks and drivers additional to those listed for climate, terrain and vegetation.
- Document the wildfire risk priorities and include details on risk and impacts on electrical system.
- Document the methodology behind the identification and prioritization of wildfire risks.
- Add a risk analysis section to document the City's risk identification and risk mitigation plans.
- Document the processes and procedures used by City to track and address enterprise-wide risks.
- Include a service restoration procedure (outside of the WMP but referenced within the plan), including restoration after a fire event.
- Document and discuss the monitoring and audit process results, including the annual WMP Performance Report, the independent evaluation results, and any identified deficiencies or recommendations and the corrective actions.

Appendix A. Statutory Compliance Review Results Table

| PUC Section 8387 | Requirement Description | Category | Compliance Met? (WMP Section) |
|------------------|--|--|-------------------------------------|
| .a | Each local publicly owned electric utility and electrical cooperative shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of wildfire posed by those electrical lines and equipment. | | Out of Independent Evaluation Scope |
| .b.1 | The local publicly owned electric utility or electrical cooperative shall, before January 1, 2020, prepare a wildfire mitigation plan. After January 1, 2020, a local publicly owned electric utility or electrical cooperative shall prepare a wildfire mitigation plan annually and shall submit the plan to the California Wildfire Safety Advisory Board on or before July 1 of that calendar year. Each local publicly owned electric utility and electrical cooperative shall update its plan annually and submit the update to the California Wildfire Safety Advisory Board by July 1 of each year. At least once every three years, the submission shall be a comprehensive revision of the plan. | | Out of Independent Evaluation Scope |
| .b.2 | The wildfire mitigation plan shall consider as necessary, at minimum, all the following: | | |
| .b.2.A | An accounting of the responsibilities of persons responsible for executing the plan. | Accounting of Responsibilities | Yes (Section III) |
| .b.2.B | The objectives of the wildfire mitigation plan. | Program Objectives | Yes (Section II) |
| .b.2.C | A description of the preventive strategies and programs to be adopted by the local publicly owned electric utility or electrical cooperative to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks. | Preventative Strategies and Programs | Yes (Section V) |
| .b.2.D | A description of the metrics the local publicly owned electric utility or electrical cooperative plans to use to evaluate the wildfire mitigation plan's performance and the assumptions that underlie the use of those metrics. | Performance Metrics | Yes (Section VIII.A) |
| .b.2.E | A discussion of how the application of previously identified metrics to previous wildfire mitigation plan performances has informed the wildfire mitigation plan. | Previously Used Metrics | Yes (Section VIII.B) |
| .b.2.F | Protocols for disabling reclosers and deenergizing portions of the electrical distribution system that consider the associated impacts on public safety, as well as protocols related to mitigating the public safety impacts of those protocols, including impacts on critical first responders and on health and communication infrastructure. | Recloser and De-Energization Protocols | Yes (Section VIII.G/H) |
| .b.2.G | Appropriate and feasible procedures for notifying a customer who may be impacted by the deenergizing of electrical lines. The procedures shall direct notification to all public safety offices, critical first responders, health care facilities, and operators of telecommunications infrastructure with premises within the footprint of potential deenergization for a given event. | Customer Notification Procedures | Yes (Section VIII.H.2) |

| PUC Section 8387 | Requirement Description | Category | Compliance Met? (WMP Section) |
|------------------------|---|---|--|
| .b.2.H | Plans for vegetation management. | Vegetation Management Plan | Yes (Section VIII.D) |
| .b.2.I | Plans for inspections of the local publicly owned electric utility's or electrical cooperative's electrical infrastructure. | Asset Inspections Plan | Yes (Section VIII.E) |
| .b.2.J | A list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks, throughout the local publicly owned electric utility's or electrical cooperative's service territory. The list shall include, but not be limited to, both of the following: (i) Risks and risk drivers associated with design, construction, operation, and maintenance of the local publicly owned electric utility's or electrical cooperative's equipment and facilities (ii) Particular risks and risk drivers associated with topographic and climatological risk factors throughout the different parts of the local publicly owned electric utility's or electrical cooperative's service territory. | Wildfire Risks and Drivers | Yes (Section IV.A) |
| .b.2.K | Identification of any geographic area in the local publicly owned electric utility's or electrical cooperative's service territory that is a higher wildfire threat than is identified in a commission fire threat map, and identification of where the commission should expand a high fire-threat district based on new information or changes to the environment. | Wildfire Risks and Drivers | Yes (Section IV.C) |
| .b.2.L | A methodology for identifying and presenting enterprise wide safety risk and wildfire-related risk. | Enterprise-wide Risk | Yes (Section IV.B) |
| .b.2.M | A statement of how the local publicly owned electric utility or electrical cooperative will restore service after a wildfire. | Damage Restoration | Yes (Section VII) |
| .b.2.N | A description of the processes and procedures the local publicly owned electric utility or electrical cooperative shall use to do all the following: | Processes and Procedures | Yes (Section VIII) |
| .b.2.N.i | Monitor and audit the implementation of the wildfire mitigation plan. | WMP Monitoring and Audit Plan | Yes (Section VIII.C) |
| .b.2.N.ii | Identify any deficiencies in the wildfire mitigation plan or its implementation and correct those deficiencies. | WMP Deficiency Identification and Correction Plan | Yes (Section VIII.D) |
| .b.2.N.iii | Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, that are carried out under the plan, other applicable statutes, or commission rules. | Asset Inspection Effectiveness Monitor and Audit Plan | Yes (Section VIII.E) |
| .b.3 | The local publicly owned electric utility or electrical cooperative shall, on or before January 1, 2020, and not less than annually thereafter, present its wildfire mitigation plan in an appropriately noticed public meeting. The local publicly owned electric utility or electrical cooperative shall accept comments on its wildfire mitigation plan from the public, other local and state agencies, and interested parties, and shall verify that the wildfire mitigation plan complies with all applicable rules, regulations, and standards, as appropriate. | | Out of Independent Evaluation Scope |

| PUC Section 8387 | Requirement Description | Category | Compliance Met? (WMP Section) |
|------------------------|---|----------|-------------------------------------|
| .c | The local publicly owned electric utility or electrical cooperative shall contract with a qualified independent evaluator with experience in assessing the safe operation of electrical infrastructure to review and assess the comprehensiveness of its wildfire mitigation plan. The independent evaluator shall issue a report that shall be made available on the internet website of the local publicly owned electric utility or electrical cooperative, and shall present the report at a public meeting of the local publicly owned electric utility's or electrical cooperative's governing board. | | Yes (Section IX) |

Appendix B. Capability Maturity Model Analysis Results Table

| Scoring Key | Interpretation |
|-------------|------------------------|
| 1-3 | Good to Best Practice |
| 4-6 | Consider Improvement |
| 7-9 | Improvement Vital |
| >=10 | Unacceptable |
| | Additional to PUC 8387 |

| City of Shasta Lake's Wildfire Mitigation Plan: Capability Maturity Model (CMM) Scorecard* | | | | | |
|--|-----------------------------|---|-------|--|--|
| Item # | Category | Components | Score | Target vs. Current State Gaps | Actions |
| 1 | Responsible Parties | Generic city roles and responsibilities. Electric Department's fire/wildfire responsibilities list. (WMP Section III) | 4 | Current: 8 bullets listed to summarize WMP responsibilities Target: Clarify and assign individual responsibilities within the Electric Department | Add WMP-focused responsibilities. Assign responsibilities to individual City staff. |
| 2 | Program Objectives | List and discussion on 3 WMP objectives (WMP Section II) | 3 | Current: Clear objectives. Actions to achieve goals are addressed Target: Continually evaluate if WMP meets objectives and update objectives as necessary. | No further action identified. Continue to monitor and update objectives. |
| 3 | Preventative Strategies | List and discussion on 8 strategies. (WMP Section V) | 2 | Current: Comprehensive policies and evidence of implementing recloser policy, deenergization policy, weather monitoring, vegetation management, asset inspections. Target: Continue to improve strategies from risk analysis, event cause analysis and lessons learned. | Proactively adapt strategies and policies. |
| 4 | Performance Metrics | List and discussion on 2 metrics and the assumptions made: # of wires down; and # of ignitions. (WMP Section VIII.A) | 3 | Current: Clear and qualitative metrics. Annual Performance Report document for tracking. Target: Use the documented data to learn and improve upon future event responses and WMP policies. | Use the documented data for lessons learned and to improve upon future event responses and WMP policies. |
| 5 | Previously Utilized Metrics | Statement that WMP will be updated based on future metric data collected. Discussion on first version of WMP and limited historical data. (WMP Section VIII.B) | 4 | Current: Limited historical records. Target: Document, track and analyze event metrics and adjust WMP accordingly. Add discussion on outcomes in next WMP. | Include discussion on historical events, their metrics, and how lessons learned have impacted policy and operations in next WMP. |
| 6 | Response Coordination | Generic discussion on City's departments and emergency response agencies coordination. External communication for emergency events. Critical infrastructure interdependencies discussed. (WMP Section II) | 4 | Current: Coordination between City departments; Standardized Emergency Management System ("SEMS") Regulations; General Electric Department Coordination with Water and Sewage operations. Target: Specifics on coordination for wildfire events | Add details of WMP-specific coordination and response coordination for wildfire event. |

| City of Shasta Lake's Wildfire Mitigation Plan: Capability Maturity Model (CMM) Scorecard* | | | | | |
|--|---|--|-------|--|--|
| Item # | Category | Components | Score | Target vs. Current State Gaps | Actions |
| 7 | Recloser and De-Energizing Protocols | Recloser blocking policy and system de-energization policy listed and discussed. (WMP Section V.G and V.H) | 2 | Current: Automatic reclosing disabled from May 1 until November 30. System de-energized when directed by authorities. Does not proactively de-energize during high fire threat periods based on the safety impacts to the City's water supply. Target: Continue to implement protocols and adapt from lessons learned as applicable. | Include discussion on past system recloser blocking and system de-energization events. Adapt protocols based on lessons learned. |
| 8 | Customer Notification Procedures | Discussion on customer communication for emergency and planned outages. (WMP Section V.H.2) | 3 | Current: Websites and social media for emergency events. Phone call in advance and follow up call for planned outages. Target: n/a | No further action identified at this time. |
| 9 | Vegetation Management Plans | Vegetation Management Plan (VMP) standards and guidelines. VMP includes inspections, tree pruning, directional pruning, tree removal, vines removal, ground-level equipment policy, herbicide management, transmission right-of-way, and standards and guidelines. (WMP Section V.D) | 2 | Current: VMP standards set according to relevant state requirements and recommendations. VMP is updated as practices and technology evolve. Vegetation management's frequency and line clearance exceeds requirements. Use technology and knowledge of vegetation to prioritize and maintain vegetation trimming schedules. Target: n/a | No further action identified at this time. |
| 10 | Electrical Line and Equipment Inspection Effectiveness Plan | Asset Inspect Plan (AIP) standards and guidelines. Policy and procedure document. Describes plan to monitor effectiveness. (WMP Section V.E, VIII.E) | 3 | Current: AIP document outlines policies set according to relevant statutes and standards. 12KV and 115KV line inspections frequency exceeds recommended requirement (Transmission 2x/yr and distribution 1x/yr). Routine inspections and post-maintenance inspections are documented in the City's Distribution Inspection Software (Partner). Target: Continue to use available technology and knowledge of electrical system for inspections. | No further action identified at this time. |
| 11 | ID and Prioritization of Wildfire Risks | List of key wildfire risk factors (topographic and climatological) (WMP Section IV) | 6 | Current: 6 risk factors are listed but the system risks are not explicitly discussed or prioritized. Risks focus on climate, weather conditions, terrain, and vegetation management. Target: Explicitly document the ID and prioritization of system risks and system impacts. | Document the risk priority. Include details on risk and impacts on electrical system. Use the Risk Analysis (CMM Item #12). |
| 12 | Risk Analysis and Drivers | Risk analysis not documented in WMP. Components can include: ID, Analysis, Prioritization, Mitigation, Informed Investment Decision, Monitoring (n/a) | 7 | Current: WMP lists and considers wildfire risks as required by the PUC statutes. Target: Document risk analysis in WMP to enhance awareness on wildfire risks and impacts and further inform the City's mitigation actions and preventative strategies. (Supplemental to CMM Item #11) | Include system risk analysis. List and prioritize risks. Discuss impacts and mitigating actions. Include discussion on historical events and a cause analysis. |
| 13 | Adequately Sized and Trained Workforce | Discussion on Electrical Department workforce training (WMP Section V.F) | 3 | Current: Workforce training for Electric Department that includes the WMP's content, proper use of fire extinguishers, and briefings on potential ignitions, environmental conditions, and other safety procedures. Target: n/a | No further action is identified at this time. |

| City of Shasta Lake's Wildfire Mitigation Plan: Capability Maturity Model (CMM) Scorecard* | | | | | |
|--|--|---|-------|---|--|
| Item # | Category | Components | Score | Target vs. Current State Gaps | Actions |
| 14 | Integration w/ Enterprise-Wide Risk | Lists identified enterprise-wide risks. Statement that commits the City to address and present any known risks from assessment. (WMP Section IV.B) | 4 | Current: WMP lists and considers risks factors and conditions. States that the City will use a methodology to track and report risks. Section II discusses the City's enterprise coordination. Target: Documented process to track and address risks within the City. Include details of the identification and notification procedure for enterprise safety and wildfire risks. | Document the processes and procedures used by City to track and address enterprise-wide risks. |
| 15 | Damage Restoration Plan | Discussion on restoration plan after outages (WMP Section VII) | 3 | Current: Maintains a policy where system stays de-energized until a crew is dispatched, and the system is manually inspected. Monitors process through SCADA and AMI system. Target: Document step-by-step restoration process. Describe restoration after a fire event. | Document step-by-step restoration process. Include a focus on restoration after a fire event. |
| 16 | Monitoring and Audit Plan for WMP | Discussion on the City's plans to monitor and review WMP. Includes: Performance Reporting, Annual City Council review, Independent Evaluation (WMP Section VIII.C) | 3 | Current: Submit and present the WMP for annual review. Prepare the annual Performance Report on documented metrics. Contracting with an independent evaluator to audit the report and present findings. Target: Incorporate learnings from historical data and events to continually improve WMP. | Include discussion on the annual Performance Report and review results. |
| 17 | Deficiency ID and Correction Plan | Discussion on ID and correction plan. Responsibility assignment. (WMP Section VIII.D) | 3 | Current: Staff evaluates WMP current practices and procedures and recommends improvements. Electric Utility Director responsible to present deficiencies to City Council. Update WMP with changes annually. Target: Document any recommendations and deficiencies. Discuss updates to WMP. | Document any recommendations and deficiencies. Discuss updates or changes to WMP. |

*The CMM framework scorecard is used based on the template referenced by the Multi-Task Consulting Services Agreement between NCPA and Siemens Industry, Inc. and the scope of work for The City of Shasta Lake's Wildfire Mitigation Plan Independent Evaluation Services. Any categories that were found irrelevant or not applicable to small municipal utilities have been removed from the template for this analysis.

Appendix C. Independent Review Consultant Experience

The following is a sample of project experience of Independent Review Consultant:

Los Angeles Department of Water and Power: Siemens EBA performed an independent review of the LADWP Wildfire Mitigation Plan and previewed a summary of the report with the LADWP board. The report assessed compliance with regulatory requirements and offered feedback and recommendations to improve the plan for the purpose of reducing wildfire risks in the LADWP service territory.

Hawaii Electric Company: Siemens EBA facilitated a stakeholder group for HECO to determine resilience priorities for the grid for the state, including mitigation of wildfire, hurricane, tsunami, earthquake and other risks. The final report was published and served as an input to system integrated planning that will incorporate resilience and risk mitigation.

Alliant Energy: Analysis and Recommendations for Improving Overhead Lines Lightning Performance and Quality of Supply to Alliant's Industrial Customers: Analyzed the lightning performance of Alliant's 69 kV power network located in Cedar Rapids, IA, and investigated methods for its improvement. Additional investigations for improvement of industrial equipment voltage sag ride-through capability were performed and recommendations were provided. Assisted Alliant Energy to plan a voltage sag monitoring campaign.

Freeport Electric: Analysis of Pipeline Induced Voltages due to the 69 kV Underground Line between Freeport's Power Plant #2 and LIPA's Bellmore Substation: Siemens analyzed the electromagnetic compatibility between these underground installations which are in Long Island, NY. Simulations were performed for electric line operation under steady-state and short-circuit conditions. Regarding the investigation of potential risks to people and installations, the pipeline-to-ground induced voltage profile was calculated and compared to typically acceptable safety limits. Recommendations against unacceptable disturbances were provided.

NERC MOD-025, -026 and -027 Compliance – Various Clients

Siemens PTI has performed compliance related testing and model validation for numerous utilities (cooperatives, municipalities, IOU and IPPs) across the US. Siemens PTI has performed testing and model validation in relation to MOD-025, -026 and -027 for over 50 power plants representing more than 15,300 MVA installed capacity.

CIP-014-1 Dynamics Study Support and Training – Lincoln Electric System

Lincoln Electric System (LES) was prepared to evaluate its steady-state CIP-014-1 compliance but needed an organization knowledgeable in performing studies on the eastern interconnection and

in addressing the unique requirements of CIP-014-1 to perform a dynamic assessment. LES also wanted to use this study as a basis by which PTI could teach LES how to run dynamics.

Siemens completed the dynamics studies for LES's CIP-014-1 compliance and collaborated with LES in defining the contingency scenario and studies needed to assure reliability and demonstrate compliance. In performing the dynamic analyses, Siemens PTI provided guidance regarding steady state findings, and established for LES that their generation remained stable for N-1 contingencies with their CIP-014 stations removed as prior outages.

KEPCO: Presentation of a Customized Course on OHTL for Maintenance Engineers including topics such as: Overview on Planning, Design and Construction activities; Technical specifications for Procurement and Testing of overhead line material; Overview on Commissioning Tests; Asset Management of overhead line components (Degradation Mode, Failure Mode, Inspection, Condition Assessment, Maintenance Actions); Lightning performance improvement; Conductor vibration; Corrosion of line components; Dynamic thermal rating monitoring systems; Overhead line uprating and upgrading; Overview on live-line maintenance; Vegetation management; Inspection and Maintenance Plans. The course was held in Schenectady, NY in the period Oct 28 – Nov 01, 2013.

Manitoba Hydro: Presentation of a customized version of the Fundamental of Overhead Transmission Line Design Course for 50 engineers in Winnipeg in the period June 10-14, 2013 (Canada).

AEP: Recommendations for Connection and Disconnection of Temporary Grounding Sets to Overhead Lines. Siemens analyzed aspects of insulation coordination for live line maintenance and potential thermal hazards to linemen in charge of installing temporary grounding sets to 345 kV de-energized circuits. The mentioned circuits are electrostatically and electromagnetically induced by various other high voltages lines (including a 765 kV line), located in the same corridor. Recommendations have been issued with respect to minimum safety distances to be respected by the AEP linemen in order to avoid electric shocks and burns.

Enterprise Risk Management Program Assessment and Action Plan

Siemens EBA evaluated the effectiveness of Tri-State Electric Cooperative's (Tri-State) ERM program, which encompassed industry best practices adapted to the environment in which Tri-State operates. Our independent assessment focused on whether Tri-State met the objectives of its Board of Director's policy and the ETRM program. In particular, we:

- Evaluated the program for its practices relative to industry standards, effective utilization of risk management techniques, tools and systems.
- Assessed program effectiveness via internal and external controls meeting Board and internal requirements.

Monitored market condition including regulatory requirements and the evolving industry environment.