

# Liberty Utilities

## Vegetation Management Program Efficacy

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# Vegetation Management Program Efficacy

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*At the direction of counsel, the following document has been prepared in order to provide Liberty Utilities (Liberty) a comprehensive assessment of the effectiveness of its Utility Vegetation Management program.*

## Introduction

In order to evaluate the effectiveness of Liberty's Vegetation Management (VM) Program, critical attributes of the program, along with field conditions, were reviewed and analyzed. Under the direction of Novembri Consulting (NC) an assessment of the current field conditions was completed by AERI, LLC. Additionally, NC performed interviews of key personnel and evaluated Liberty responses to various data requests detailing information about the program. A key area reviewed was Liberty's maintenance cycle, how it compares to other California utilities, and if the current cycle is adequate to maintain compliance with regulations.

An evaluation of the VM Program was performed and as a result of that review, recommendations for program improvements have been included in this report for Liberty's consideration.

## Process

The following inputs were used to assist in determining Liberty's VM Program efficacy.

1. Field Assessment<sup>1</sup> – Completed in November 2020
2. Maintenance Cycle – Evaluation was based on the following:
  - Results of the Field Assessment
  - Historical encroachments into the mandated clearance zone
  - Historical vegetation related outages
  - Historical vegetation related fires
  - System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI)
  - Best management practices of other California utilities in scheduling and performing VM work.

## Field Assessment

The Field Assessment was conducted on portions of nine 14.4kV distribution circuits. The circuits assessed are located within the Tier 2 and Tier 3 High Fire-Threat Districts (HFTD) incorporating the South, West, and North shores of Lake Tahoe. The assessment was conducted between October 26, 2020 and November 6, 2020.

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<sup>1</sup> Refer to "Field Assessment Report\_2021124.pdf" for a detailed analysis

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The following State Regulatory Requirements were taken into consideration during the assessment:

- General Order (GO) 95, Rule 35, Case 13 and Case 14
- GO 95, Appendix E
- GO 95, Rule 37
- Public Resource Code (PRC) 4293
- PRC 4292
- California Code of Regulation (CCR) 1250-1258

In addition to the above stated regulations, the following Liberty-specific practices were reviewed:

- Accuracy of Liberty's tree records
- Whether field work met Liberty's work specification requirements
- Whether field work met ANSI A300 best practices

**Discussion:** The results of the Field Assessment indicated the following:

- Liberty does not appear to have a complete inventory of trees that were maintained in the past or will be maintained in the future<sup>2</sup>
- 21 (7.3%) of the 284 total trees audited were within the mandated clearance zone required by GO 95, Rule 35 and PRC 4293
- 39 (13.7%) of the 284 total trees audited did not meet Liberty's work specification requirements
- 8 (2.8%) of the 284 total trees audited did not meet ANSI A300 standards
- 20 (12.4%) of the 161 total poles audited were found with vegetation or flammable materials within the mandated clearance zone required by PRC 4292

Additional information, which is based on Liberty records, indicates that out of a total of 14,349 trees inspected in 2019, 2,809 (19.5%) were found to be encroaching into the mandated clearance zone. There was an improvement in 2020 with a total of 14,881 trees being inspected and 2,306 (15.4%) found to be encroaching into the mandated clearance zone.

As noted in the results, there was a large percentage of poles, more than 12%, found to have vegetation or other flammable material within the mandated clearance zone of 10-feet<sup>3</sup>. In other cases the clearance cylinder, which extends to the highest high-voltage conductor attachment, was not clear of vegetation. Since poles are inspected and cleared on an annual basis, this high percentage may be a result of poor quality control.

Based on the Field Assessment results and historical records, there is a concern about the number of trees that were found to be encroaching into the mandated clearance zone. There appears to be multiple contributing factors.

- The lack of a complete tree inventory

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<sup>2</sup> See Field Assessment Report – Findings 3, 9, 11, and 12

<sup>3</sup> 10-foot radius from the outer circumference of the pole

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- Completed work that does not comply with Liberty's specification
- Inadequacy of a 3-year maintenance cycle

There were no vegetation related fires reported during the evaluation period. SAIDI and SAIFI were reviewed and a few anomalies were identified.

### ***Recommendations:***

1. The lack of a complete tree inventory is likely contributing to number of missed trees. Liberty should continue to update and refine the tree inventory database during each inspection. This, along with the full implementation of LiDAR inspections, will result in fewer missed trees (see "LiDAR Inspection" section below).
2. A significant number of trees (13.7%) did not comply with Liberty's contract specification. In most of these cases the prescribed clearances were not attained at the time of VM work. This can result in encroachments into the mandated clearance zone prior to the next cycle. Liberty should ensure contractors are meeting the requirements set forth in the specification for clearances to be achieved during the completion of VM work. This scrutiny will likely result in fewer encroachments into the mandated clearance zone in between inspections.
3. Based on the data gathered during the Field Assessment and information provided by Liberty in response to data requests, it appears that the current 3-year cycle is not adequate to ensure compliance with mandated clearances and should be modified (see "Maintenance Cycle" section below).
4. The large number of poles that were not adequately cleared to meet the mandated clearance requirements, found in PRC 4292, appear to be due to a quality control issue. The contractor responsible for pole brushing should be made aware of the issues identified and implement the necessary changes to ensure pole brushing meets Liberty's requirements throughout the fire season. Liberty indicated that its QA/QC program is still under development. As part of that development, Liberty may need to implement a more structured audit of the pole brushing contractor's work.
5. Liberty should transition to a modified clearance regiment over the next two years based on the following recommended clearances.

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### Vegetation Clearances

#### *Phase I – Implementation 2021*

Regulations – PRC 4293; GO 95, Rule 35, Extreme and Very High Fire Areas (Case 14)

Voltage	Regulation Clearance Distance <b>RCD</b>	Trigger Clearance Distance <b>TCD</b>	Maintenance Clearance Distance - Minimum <b>MCD</b>
14.4kV	4'	6'	12' – 15'
60kV	4'	6'	12' – 15'
120kV	10'	15'	30'

**RCD** – Clearance distance between conductors and vegetation that is mandated by regulations.

**TCD** – Clearance distance that triggers the work scheduling process. The TCD is based on the regulation clearance with a safety margin multiplier of 1.5. This identified work generally needs to be completed within the next year.

**MCD** – Clearance distance to be achieved at time of work. Minimum clearances based on Rule 35, Appendix 'E'. Clearance to be increased, as needed, based on vegetation growth rates.

#### *Phase II – Implementation 2022-2023*

Regulations – PRC 4293; GO 95, Rule 35, Extreme and Very High Fire Areas (Case 14)

Voltage	Regulation Clearance Distance <b>RCD</b>	Compliance Clearance Distance <b>CCD</b>	Trigger Clearance Distance <b>TCD</b>	Maintenance Clearance Distance - Minimum <b>MCD</b>
14.4kV	4'	6'	9'	12' – 15'
60kV	4'	6'	9'	12' – 15'
120kV	10'	15'	18'	30'

**RCD** – Clearance distance between conductors and vegetation that is mandated by regulations.

**CCD** – Clearance distance to maintain regulatory compliance for a 1-year period. The CCD is based on the regulation clearance with a safety margin multiplier of 1.5. This identified work generally needs to be completed within the next year.

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**TCD** – Clearance distance that triggers the work scheduling process. The TCD adds 3-feet to the CCD. The logic for adding 3-feet to the CCD to determine the TCD was to ensure the clearance can be easily observed by field personnel and to provide a buffer should a tree be missed during an inspection. Since growth rates vary significantly by species, we felt 3-feet was the appropriate distance to ensure the CCD is not compromised.

**MCD** – Clearance distance to be achieved at time of work. Minimum clearances based on Rule 35, Appendix 'E'. Clearance to be increased, as needed, based on vegetation growth rates.

### Maintenance Cycle

Liberty's current stated inspection cycle for tree work is approximately 3-years, with an annual inspection being conducted in the Tier 3 HFTD.

Based on 2020 records the approximate time period between inspections and tree work exceeds 300 days.

Pole brushing is conducted on an annual basis.

### VM in California

Typical VM programs, outside of California, rely on a "cycle" approach to manage a system's workload. A cycle is generally defined as the time it takes to fully inspect and perform VM work on an entire system, at least once. Based on past benchmarking and similar projects outside of California, we know the average cycle for distribution systems (<200kV) ranges from five to seven years. For transmission, or Bulk Electric Power Systems (>200kV), the national standard FAC-003 requires annual inspections and mitigation of VM issues. This results in a national 1-year cycle for all transmission lines.

Due to the increasingly severe fire seasons in California, and by virtue of California having the strictest mandatory clearances requirements for distribution lines in the country, the state's major investor-owned utilities have abandoned the historic cycle approach to VM. Utilities such as PG&E, SCE and SDG&E, rely on inspecting all lines at least once a year and then completing all VM work before it results in an encroachment into the mandated clearance distance.

**Discussion:** Liberty's current 3-year maintenance cycle appears to be the primary contributor to vegetation encroachments into the mandated clearance zone. In some cases the maintenance cycle was found to exceed 3-years<sup>4</sup>.

As previously discussed, more than 15% of inspected trees in 2019 and 2020 were found to be within the mandated clearance zone. This percentage is significantly higher than what is typically observed at other California utilities (generally less than 5%).

Another significant contributor appears to be the time-lag between inspections and tree work.

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<sup>4</sup> See Field Assessment Report – Finding 6

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### **Recommendations:**

1. Other California utilities have moved to an inspection driven program where more frequent inspections are performed and VM work is limited to what is necessary between scheduled inspections periods.

Consideration should be given to implementing annual inspections for all distribution lines. This could be accomplished using LiDAR (see “LiDAR Inspections” below) in conjunction with ground inspections.

Liberty should be aware that annual inspections will likely result in an increased workload, which will require an adjustment in the number of field resources.

Consideration should also be given to more frequent inspections in the Tier 3 areas (e.g., prior to fire season, again in the September timeframe). This will help ensure Liberty remains in compliance with the mandated clearance requirements throughout the fire season.

2. In order to manage the VM program effectively, work prescriptions must be provided to the tree contractor in a timely manner. With a Liberty reported average time-lag of 300 days, the prescription in many cases is no longer valid and the notification given to the property owner is outdated. The timing between inspections and the assignment of work to the tree contractor should be weeks not months. We were unable to identify the exact cause for this time-lag but the following could be contributing factors.

- Liberty’s internal processes, such as the timing of the assignment of work to the tree contractor once inspections are completed
- Inspection company processes, such as the timely uploading of inspected work to the work management system
- If work is being assigned to the tree contractor in a timely manner, scheduling may be impaired due to an inadequate number of tree crews
- Although not evaluated, crew productivity, even under a unit price contract, could adversely impact the timing of the scheduling process

Liberty should evaluate the possible causes and take corrective actions as necessary.

### **LiDAR Inspections**

**Discussion:** Liberty’s approach to LiDAR inspections is consistent with industry standards. Fifty percent of Liberty’s system was completed in 2020 and the remaining fifty percent is scheduled to be completed in 2021. The recommendation to conduct annual LiDAR inspections for change management, is currently being evaluated. Annual LiDAR inspections for short and long-term planning have become a best practice at many utilities. Improved technology and data acquisition processes will likely bring the cost down in the future.

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Once anomalies are identified using LiDAR, an inspection should be conducted by the pre-inspection company to confirm the work is actually needed and, if so, prescribe the necessary work and handle necessary customer and/or agency notifications.

Currently, the LiDAR results provided by Quantum Spatial are based on the following criteria:

Zone 1 – Within 18-inches (Critical)

Zone 2 – Within 4-feet

Zone 3 – Within 6-feet

Zone 4 – Within 12-feet

### ***Recommendations:***

Liberty's use of LiDAR for distribution VM is actually an advanced aspect of the program. We are not aware of any other utilities in the state that have completed LiDAR scans of 50% of their distribution lines at this time. We believe Liberty is heading in the right direction and that LiDAR should become an ongoing tool in its VM program.

Future results should be modified as described below and include a Zone for vegetation within 9-feet as noted in the Phase II Clearance recommendations.

Zone 1 – Within 4-feet (Critical)

Zone 2 – Within 6-feet

Zone 3 – Within 9-feet

Zone 4 – Within 12-feet