Annual Report
2024 Vegetation Management Report
and 2025 Vegetation Management Plan
20 CSR 4240-23.030
April 1, 2025

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Director, Transmission and
Distribution – Central Region

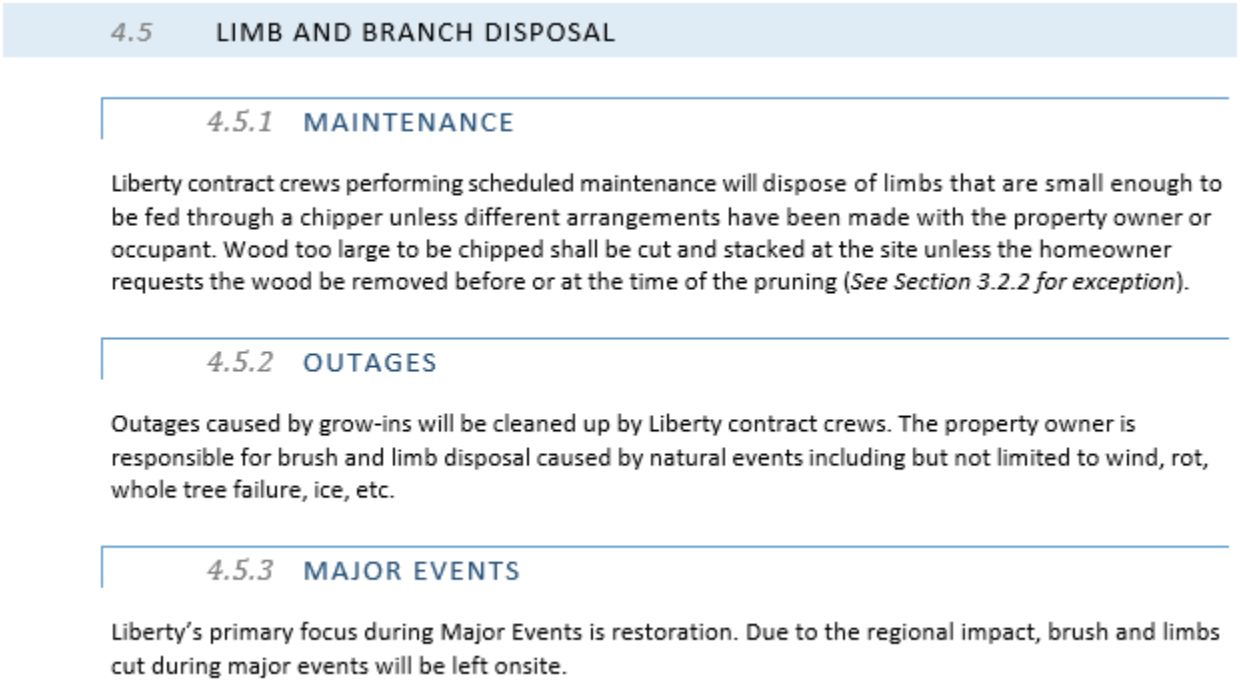
2024 Vegetation Management Report

Pursuant to Missouri Public Service Commission ("Commission") Rule 20 CSR 4240-23.030, The Empire District Electric Company d/b/a Liberty or Liberty Utilities prepared and provides its 2024 Vegetation Management Report and 2025 Vegetation Management Plan.

Rule 23.030(6)(B) provides that Liberty "shall monitor and document all scheduled vegetation management and related activities it or its contractors performs." The rule specifies that documentation shall include: (1) identification of each circuit and substation where vegetation management was performed; (2) the type of vegetation management performed including removal, trimming and spraying and methods used; (3) the crew size and supervisor's name; (4) the date of activity; (5) any safety hazards encountered; and (6) any unexpected occurrence or accident resulting in death, life-threatening or serious injury to a person assigned to perform vegetation management activities or the public.

Rule 23.030(6)(C) provides that "(e)ach electrical corporation shall include a summary of the information required in subsection (6)(B) above about its vegetation management during the past year, and vegetation management planned for the following year in an annual report to be filed with the commission by April 1 each year, with verification by affidavit of an officer who has knowledge of the matters stated therein." The rule specifies that the report shall also include: (1) expenditures for vegetation management in the preceding year; (2) vegetation management budget for the current year; (3) circuits, completion dates and miles trimmed in the preceding year; (4) circuits, completion dates and miles scheduled for the current year; and (5) total distribution miles for the system and corresponding classification between rural and urban.

4(F)2. Standard Procedures regarding Removal of Trimmings. See attached *Vegetation Management Guidelines Final 2024.pdf*, Pg.14



4.5 LIMB AND BRANCH DISPOSAL

4.5.1 MAINTENANCE

Liberty contract crews performing scheduled maintenance will dispose of limbs that are small enough to be fed through a chipper unless different arrangements have been made with the property owner or occupant. Wood too large to be chipped shall be cut and stacked at the site unless the homeowner requests the wood be removed before or at the time of the pruning (*See Section 3.2.2 for exception*).

4.5.2 OUTAGES

Outages caused by grow-ins will be cleaned up by Liberty contract crews. The property owner is responsible for brush and limb disposal caused by natural events including but not limited to wind, rot, whole tree failure, ice, etc.

4.5.3 MAJOR EVENTS

Liberty's primary focus during Major Events is restoration. Due to the regional impact, brush and limbs cut during major events will be left onsite.

6(C).
Summary of the information required in subsection 6(B). Liberty Utilities contracted with seven contractors to assist in maintaining the vegetation on the system.
They include:

- 12 CN Utility Consultant foresters, who plan and audit the work performed.

- 29 Wright Tree Service employees which includes 2 General Foreman under the supervision of a Project Manager. 10 two-men bucket/manual crews and 3 two-man spray crews.
- 25 Shade Tree employees which includes 2 General Foreman under the supervision of a Regional Project Manager. 11 two-men bucket/manual crews.
- Kenny Singer Construction utilized for a variety of heavy equipment situations and planning and application of TGR and herbicide.
- Growth Solutions utilized for the application Tree Growth Regulator.
- Mid Central Contractors operate special mechanical clearing equipment on an as needed basis for select right-of-way situations.

There were no incidents of safety hazards or accidents that resulted in death or serious injury in 2024.

6(C)1.
Expenditures for vegetation management in the preceding year of 2024: $7,225,667.84

6(C)2.
Vegetation Management's budget for the current year of 2025: **$6,782,572.00**

6(C)3.
Circuits completion dates and miles trimmed in the preceding year:

West Side		
Circuit ID	**2024 Planned Miles**	**Completion Date**
1091	18.3	2/23/2024
1092	75.7	3/4/2024
1093	7.9	3/18/2024
1094	23.8	4/11/2024
3951	39.2	5/7/2024
3952	42.7	4/11/2024
3953	35.2	9/4/2024
4691	2.3	9/5/2024
4692	29.1	9/9/2024
4693	0.9	8/29/2024
4031	29.5	5/30/2024
1050	14.3	9/26/2024
1051	13.5	12/9/2024
1052	11	12/31/2024
1082	120.6	9/17/2024
1084	1.2	9/17/2024
1311	24.6	5/15/2024
1312	49.8	8/5/2024
4142	15.9	12/18/2024
West Side Total	555.5	

East Side		
Circuit ID	**2024 Planned Miles**	**Completion Date**

2951	37.5	8/6/2024
2952	10.4	4/18/2024
4381	3.1	4/21/2024
3591	15.9	8/26/2024
3593	5.3	12/9/2024
1521	31.7	11/25/2024
1523	54.9	12/4/2024
3621	74.4	8/6/2024
4371	42.3	9/19/2024
4372	41.6	8/20/2024
4373	72.7	9/23/2024
6021	23.9	12/26/2024
6022	5.3	11/6/2024
6023	2.3	11/14/2024
6024	6.3	10/21/2024
2171	34.2	3/12/2024
2172	34.2	11/13/2024
4091	19.4	7/30/2024
4092	27	7/29/2024
2491	14.6	4/4/2024
2492	6.2	4/1/2024
East Side Total	563.2	
2024 Total	1118.7	

6(C)4.

Scheduled Mileage for 2025:

2025 Circuit ID	Miles Planned
1451	10.5
1453	20.3
1454	14
1455	7.7
2842	2
2843	1.3
1452	21.3
1101	1.7
1102	13.2
1103	20.2
1104	4
1052	11
4322	0.2
4324	3.7
3661	15.1
3662	25.5
3663	29.9
3664	42.3
145D	0.1
4221	2.6
4476	3.2
3221	34.4
4432	27.4
4433	2.8
3121	16.4
3311	7.9
3312	4.7
3313	6.1
3314	5.9
3315	26.1
4101	18.1
4102	10.5
2211	19.8
3594	9.3
1522	15.8
3551	10.8
4511	15.2
4512	3.6
4513	3.9
2212	49.3
2622	11.4
1241	29.2
4601	42.8
3231	19.7

3232	**14.6**
3671	**8.8**
3672	**0**
3673	**20.1**
3675	**4.6**
4091	**19.4**
4182	**14.7**
4311	**9.5**
4312	**6**
4313	**27.5**
2511	**26**
2621	**90**
1211	**73.5**
1212	**28.6**
1213	**28.8**
3701	**22.2**
3691	**5.6**
3692	**10.8**
3693	**4.2**
3971	**18.8**
4792	**3.4**
4793	**10.9**
4794	**3.4**
Total 2025 Miles	**1092.3**

6(C)5.
Total Distribution miles for the system; and corresponding classification between rural and urban.
The total overhead distribution miles on Liberty Utilities Central system are 5,612; classified as 1,802 Urban miles and 3,810 Rural Miles.

8(A,B,C).
Highlights of Liberty Utilities' public education and outreach program for 2024 included:

- Distribution of door cards containing information on the importance of planting the right tree in the right place.
- Targeted handouts about the Emerald Ash Borer for customers with Ash trees in their yards.
- Conducted annual Tree Line USA training for all contracted vegetation management crews. Additionally, offered an online educational tree and plant identification course through Grow With Trees.
- Completion of a full rotation of training for contract employees through the Grow With Trees training program.
- Collaboration with the National Arbor Day Foundation to offer over 500 Energy Saving Trees to customers who participated online by entering their address, selecting a tree, and learning about its energy-saving benefits. Partnered with the City of Ash Grove, City of Joplin, and Missouri Department of Conservation for the tree giveaway.
- Partnered with VOICE (Vocational Opportunities Inspiring Children in Elementary) at Pierce City Elementary to provide saplings to children along with educational booklets.
- Teamed up with Riverton Ks Park members with Liberty volunteers and planted milkweed and other plants to help with the benefits pollinators on the transmission Right of Way.
- Presentation by Jason at a City of Bolivar meeting about the Power to the Pollinator Program.
- Career Day engagement in Lawrence County, where approximately 150 students were informed about career opportunities in Utility Forestry.

In Addition to 16 years as a Tree Line USA certified utility through the Arbor Day Foundation, Liberty was awarded Rights of Way Stewardship status from the Right of Way Stewardship Council (ROWSC) in 2023. Liberty has continued the accreditation in 2024. The ROWSC Accreditation program was created to evaluate environmental stewardship standards of excellence for utility vegetation management along ROW. The goal of ROWSC Accreditation Standards is to promote application of IVM best management practices that maintain power system reliability and provide ecological enhancements on managed ROW. Liberty became the 8th utility in North America to achieve this status since 2013.

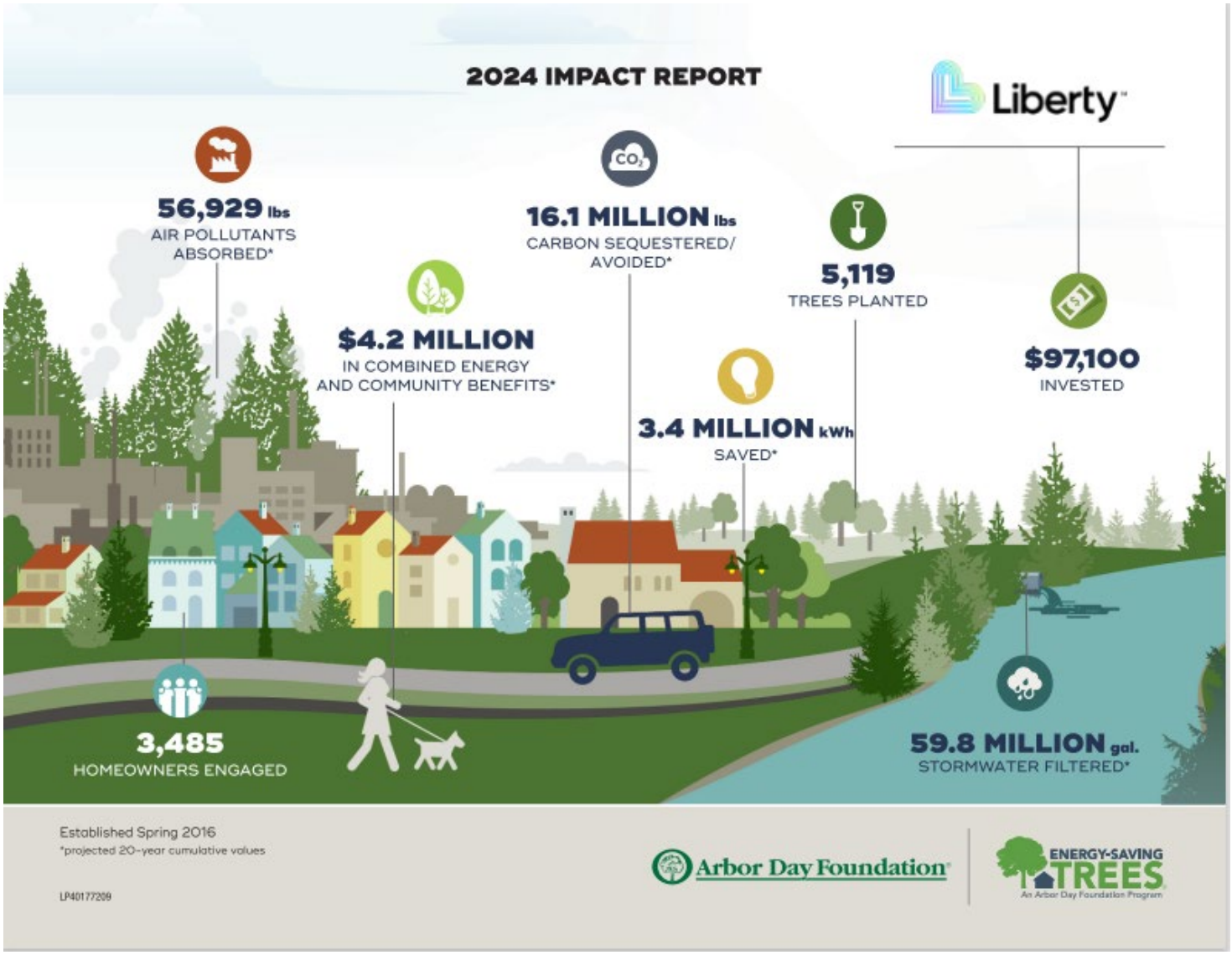


Figure 1. Energy Savings Trees infographic showing the benefits of Liberty's Tree giveaway program over time

VEGETATION MANAGEMENT GUIDELINES FOR ENHANCED ELECTRICAL RELIABILITY

Liberty Central manages vegetation across 7200 miles of Transmission and Distribution lines spanning four states. Embracing an Integrated Vegetation Management approach, Liberty strategically employs Conventional, Mechanical, and Chemical practices to foster Biological Control within its Rights-of-Way, ensuring reliability and environmental stewardship.

Title: Vegetation Management Guidelines for Enhanced Electrical Reliability		Author: J. Grossman	
Distribution Vegetation Management Policy		Revision: E	11/1/2018
Revision	**Date**	**Changes**	**Approved By**
A	8/9/2008	Formalized existing documentation	McGarrah, Palmer
B	3/1/2009	Review in conjunction with our new tree trimming contracts. See letter dated Jan 30, 2009.	McGarrah, Palmer
C	3/15/2012	Annual Review – no changes.	Wallace, Penning
D	3/22/2013	Annual Review – The addition of TGR specifications. See 2.2.4 and Appendix 8.	Wallace, Penning
E	11/1/2020	Changes in standards that reflect our system's status. Update Utility Name	Haralson, Wilson
F	5/28/2024	Update to current practices and standards, added action thresholds	Babbitt, Wilson

Approval Signatures and date:

DocuSigned by:
Eric Babbitt
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5/29/2024

Eric Babbitt, Senior Director, Transmission and Distribution - Central Region

DocuSigned by:
Tim Wilson
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5/29/2024

Tim Wilson, President, Central Region-Electric

Applicable Standards: 4 CSR 240-23.030, Title 165 Oklahoma Corporate Commission Chapter 35. Electric Utility Rules, ANSI A-300, ANSI Z133,

CONTENTS

INTRODUCTION

The objective of the Vegetation Management Guidelines for Enhanced Reliability is to establish robust policies and procedures for Liberty Utilities to effectively manage vegetation along its Right of Way (ROW). As a leader in the industry, Liberty is committed to employing innovative, data-driven decision-making processes to ensure the utmost reliability of its infrastructure. This guideline emphasizes the importance of ongoing education and training for employees, sustainable practices that promote compatible vegetation, and other industry-leading strategies to enhance the overall effectiveness of utility vegetation management. This guideline applies to all of Liberty's electric lines rated at 25kV and below, aiming to improve reliability, minimize public risk, and mitigate encroaching vegetation concerns.

1 SAFETY

1.1 SAFETY REQUIREMENTS

Contractors engaged in vegetation clearing from utility Right of Ways are mandated to uphold safety standards and regulatory compliance as per OSHA 1910.269, ANSI Z133, and ANSI A300 guidelines. Safety remains paramount, requiring adherence to approved safety guidelines and procedures throughout the project duration. Regulatory compliance extends to all governmental safety and health regulations, including contractual safety provisions with Liberty, ensuring that every aspect of the work aligns with legal requirements at the Municipal, County, State, and Federal levels.

A comprehensive understanding of Liberty's electric facilities is imperative before work begins, encompassing knowledge of circuit voltages and the operational nature of energized circuits. When undertaking vegetation management tasks, contractors must obtain voltage information from Liberty, maintain public safety protocols, and implement robust measures to protect their employees and the public. In instances where working with energized circuits poses an elevated risk to personal safety or system integrity, contractors are required to promptly notify Liberty representatives for appropriate safety measures or circuit de-energization otherwise Contractors shall understand that electric facilities must remain energized during work.

Furthermore, contractors must operate with diligence to prevent damage to Liberty's infrastructure or interruptions to electrical service. Any accidental contact with Liberty conductors or resulting service interruptions must be immediately reported to Liberty, with all related repairs and damages being the contractor's responsibility. Additionally, contractors are tasked with promptly reporting any observed hazards in Liberty's facilities during their operations, ensuring swift corrective action to maintain safety and reliability.

In conjunction with these operational guidelines, contractors engaged in herbicide application must adhere strictly to industry best practices and regulatory guidelines. This includes comprehensive training for employees, meticulous equipment uses and maintenance, and proper disposal procedures to minimize environmental impact and uphold worker safety standards. By integrating these standards and protocols into their operations, contractors contribute to the overall safety, reliability, and compliance of vegetation management activities within utility ROWs. Refer to Section 5 for more information on herbicides.

2 GENERAL GUIDELINES

2.1 INTEGRATED VEGETATION MANAGEMENT

Liberty employs an Integrated Vegetation Management (IVM) approach encompassing a range of techniques such as conventional crews, herbicide application, mechanical clearing equipment, Tree Growth Regulators (TGR), and efficient work planning to sustainably manage its Right of Way (ROW). The overarching objective is to achieve biological control through strategic species competition on the ground and directional pruning along the sides. This strategy aims to prevent the establishment of tall woody vegetation on the ROW while training trees to grow away from power lines in compliance with ANSI A300 standards.

Furthermore, Liberty is dedicated to conducting plant surveys and closely monitoring the effects of vegetation management activities. This meticulous monitoring allows for adaptive management practices that convert ROWs into compatible ecosystems, offering multiple ecological benefits. The goal is to foster high-quality wildlife habitat and enhance aesthetic value where feasible. Specifically, the management approach seeks to maintain a balanced 60/40 ratio of grasses and forbs to low-growing woody shrubs on the ROW, promoting ecosystem resilience and supporting diverse flora and fauna populations.

2.2 MAINTENANCE CYCLE

Liberty shall maintain a cycle for vegetation management based on the number of customers per mile. Circuits with customer density >35 customers per mile shall be considered Residential and be placed on a 3-year cycle. Circuits with <35 customers per mile shall be considered Rural and be placed on a 6-year cycle. Exceptions may be made for circuits with commercial load or critical facilities such as hospital, police, fire departments, etc. A Mid-Cycle Inspection will be performed on the rural circuits to ensure the circuit will remain reliable until the next maintenance cycle. TGR and Herbicide work will be performed pre-maintenance so that they may be audited during the maintenance cycle.

To improve efficiency, all circuits from a substation will be placed on the same schedule. This allows Substations with Rural and Residential circuits to be worked on the same cycle.

Circuit Type	Maintenance cycle (yrs.)	Mid-Cycle Inspection (yrs.)
Residential	3	2
Rural	6	3

Table 1. Maintenance and Inspection Cycle based on circuit type.

2.3 SCHEDULING AND CIRCUIT PRIORITIZATION

The scheduling of circuits and substations for vegetation management will follow a tree unit-based approach. Given the variability in tree density per mile across the system, this approach aims to address fluctuations in staffing and maintain a stable workforce. By scheduling consistent tree units annually, we aim to achieve predictability in workload and effectively manage labor demands.

Liberty's belief is that a well-trained and stable workforce is essential for ensuring consistent quality work, ultimately delivering superior results at optimal costs.

Circuits may be adjusted during the year based on the following factors:

- Reliability – The circuits due to be pruned for any given year are weighted based on customer minutes interrupted by tree-related causes. Circuits that have the highest number of customer minutes interrupted by tree outages may rank higher. SAIFI and SAIDI
- Last Trim Date – Circuits are scheduled based on the last pruned date. The oldest are weighted over the earliest.
- Customers Affected – Circuits are ranked by customer count. Circuits with high numbers of customers or circuits with critical customers are ranked higher.
- Current Vegetation Conditions – The current vegetation conditions on a circuit will be used to prioritize it. Customer requests for tree pruning are also taken into consideration when determining the current vegetation conditions of a circuit.
- Other – Other factors that are considered when scheduling is circuit load, customer complaints, workload, efficiency, and political issues.

2.4 ECOREGION DESCRIPTIONS

Liberty's footprint spans two US EPA Level III Ecoregions as shown in Figure 1. Descriptions of landform, vegetation composition, and dominant land uses are provided below.

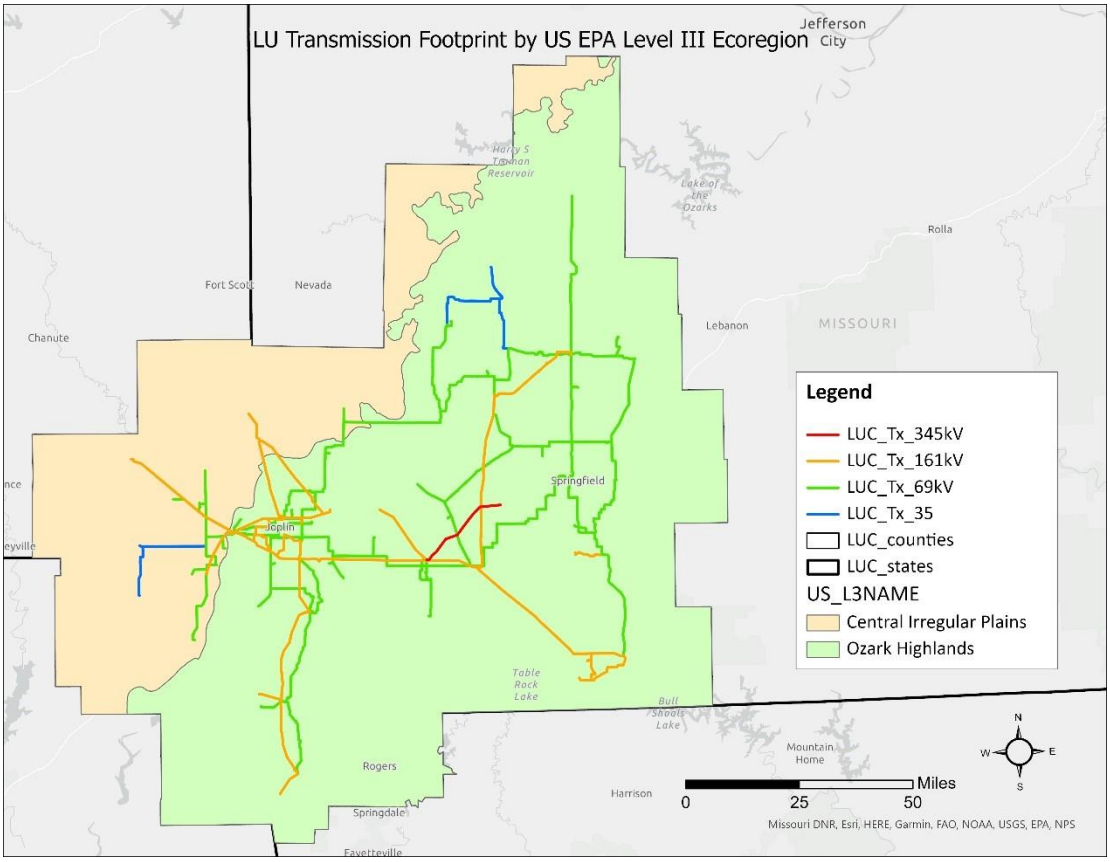


Figure 1 Liberty's Footprint by US EPA Level III Ecoregion

OZARK HIGHLANDS

The Ozark Highlands ecoregion has a more irregular physiography and is generally more forested than adjacent regions, with the exception of the Boston Mountains (38) to the south. Soils are mostly derived from cherty carbonate rocks. Cambrian and Ordovician dolomite and sandstone comprise the dominant bedrock in the interior of the region with Mississippian limestone underlying the western outer regions. Karst features, including caves, springs, and spring-fed streams are found throughout most of the Ozark Highlands. The majority of the region is forested; oak is the predominant forest type, but mixed stands of oak and pine are also common, with pine concentrations greatest to the southeast. Less than one fourth of the core of this region has been cleared for pasture and cropland, but half or more of the periphery, while not as agricultural as bordering ecological regions, is in cropland and pasture.

CENTRAL IRREGULAR PLAINS

The Central Irregular Plains have a mix of land use and are topographically more irregular than the Western Corn Belt Plains to the north, where most of the land is in crops. The region, however, is less irregular and less forest covered than the ecoregions to the south and east. The potential natural vegetation of this ecological region is a grassland/forest mosaic with wider forested strips along the streams compared to the north. The mix of land use activities in the Central Irregular Plains includes mining operations of high-sulfur bituminous coal.

3 WORK PLANNING

Liberty employs a work planning service to allocate resources based on work scope and type. Pre-planned work enhances the efficiency of contract crews by identifying access points, addressing customer inquiries in advance of work commencement, and pinpointing the actual work locations. Prior to work initiation, Liberty or its agents conduct a pre-work inspection to assess the required work volume and types necessary for circuit reliability within the maintenance cycle. Following completion, an audit verifies circuit reliability for the subsequent cycle and ensures adherence to clearance specifications. Utilizing GPS-based Electronic Workflow Management software, Liberty tracks planning, work completion, and auditing processes.

3.1 NOTIFICATION

3.1.1 PRIVATE PROPERTY

Liberty or its agents will make a diligent attempt to notify property owners or occupants by personal contact, door hanger or mailer. Notification shall occur seven (7) days before any work is performed and no more than ninety (90) days after notification. A record of the date, content and address shall be maintained until the subsequent Maintenance Cycle has passed. If the work required is deemed an emergency due to an eminent outage, public safety issue, etc., the 7-day window will be waived, and the work shall be completed to ensure safe and reliable service. A Door Hanger with contact information will be left for the property owner or occupant, informing them of the situation.

3.1.2 COUNTY AND MUNICIPAL

Liberty shall provide each county and municipality at minimum two (2) months' notice of any scheduled Vegetation Management maintenance activities to a primary contact mutually agreed upon.

3.2 VEGETATION INQUIRIES

Liberty will respond to requests related to tree/right-of-way maintenance within 5 business days. After reviewing the situation, a priority level will be assigned, and the request will be scheduled. The property owner will be informed of the results of the inspection. Liberty will decide if the work requested will benefit the overall safety and reliability of the electric system, its customers and the general public.

3.2.1 CUSTOMER REQUESTED PRUNING

When a customer requests Liberty to prune a tree away from pole-to-pole lines, Liberty will send out a representative to make a determination of any risk. If it is determined that pruning/removal is necessary for safety or reliability, Liberty will schedule a crew to prune/remove the tree(s) in question. For off-cycle work, at the request of the customer, all limbs and wood shall be left on site unless otherwise arranged prior to work.

If the tree is not a significant risk, Liberty will inform the customer that the tree will be re-evaluated when that circuit is scheduled for maintenance.

Service drops are the customer's responsibility. Crews will not be re-directed unless there is an immediate threat to Liberty facilities. However, they will be picked up on regularly scheduled maintenance as needed.

3.2.2 CUSTOMER REQUESTED ASSISTANCE

When a customer desires to prune/remove a tree close to Liberty lines for reasons other than line clearance, Liberty will send out a representative to make a determination of any potential risk that exists. Liberty will do one of the following after customer notification:

- Temporarily drop the conductor while the customer or customer's agent performs the work.
- Prune or remove the portion of the tree to meet the 10' minimum Overhead Powerline Safety Act.
- Inform the customer that the work is outside the scope of Liberty's responsibility and no work will be done by Liberty at this time.

In all cases, the decision on which course of action to take will be determined by Liberty or a Liberty representative after consultation with the customer. On Customer Requested Assistance work, limbs and branch cleanup will be the responsibility of the property owner.

4 CONVENTIONAL CLEARING

Trees are pruned to provide adequate clearance from Liberty facilities at the time of trimming for the cycle length. ANSI-A300 and ANSI Z133.1 procedures and techniques will be followed.

The following guidelines (Table 2.) are minimum tree clearances that may apply at the time of pruning to protect the wires under normal operating conditions. Special clearances may be needed at times because of field conditions. Tree species are categorized into fast and slow growing (Table 3).

Clearance From Trees	Rate Of Growth	Secondary Cable (120-480V)	Open Wire Secondary (120-480V)	Primary Voltage Single Phase	Primary Voltage Three Phase
Side	Slow	3	6	10	10
	Fast			15	15
Over	Slow	3	6	15	Remove all Overhang
	Fast			15	
Under	Slow	3	8	10	10
	Fast			15	15

Table 2. Recommended Line Clearances (in feet).

Common Name	Scientific Name	Growth Rate
Aillanthus	*Ailianthus Altissima*	F
Ash, White	*Fraxinus americana L.*	F
Ash, Green	*Fraxinus pennsylvanica*	F
Basswood	*Tilia american L.*	F
Birch	*Betula nigra*	F
Black Walnut	*Juglans Nigra*	F
Boxelder	*Acer negundo*	F
Bradford Pear	*Pyrus calleryiana*	F
Buckeye	*Aesculus*	S
Catalpa	*Catalpa bignonioides*	F
Cherry	*Prunus scrotina*	F
Cottonwood	*Populus deltoides*	F
Dogwood	*Cornus florida*	S
Eastern Redcedar	*Juniperus virginiana*	S
Elm	*Ulmus sp.*	F
Ginkgo	*Ginkgo biloba*	F
Hackberry	*Celtis occidentalis*	F
Hickory	*Caryatexana sp.*	S
Honey locust	*Gleditsia triacanthos*	F
Hybrid Maples	*Acer sp.*	F
Kentucky Coffee Tree	*Gymnocladus dioica*	F
Locust	*Robinia sp.*	F
Mimosa	*Mimosa pudica*	F
Mulberry	*Morus sp.*	F
Osage Orange	*Maclura poynifera*	F
Pin Oak	*Quercus palustris*	F
Pine	*Pinus sp.*	S
Poplar	*Populus alba*	F
Post Oak	*Quercus stellata*	S
Red Bud	*Cercis canadensis*	S
Red Oak	*Quercus rubra*	S
Sassafrass	*Sassafrass albidum*	F
Silver Maple	*Acer saccharinum*	F
Sugar maple	*Acer saccharum*	S
Sweetgum	*Liquidambar styraciflua*	F
Sycamore	*Platanus occidentalis*	F
White Oaks	*Quercus alba*	S

Table 3. Major tree species and growth rates.

4.1 CONSIDERATIONS FOR PRUNING

Factors to consider before pruning include:

- The growth rate of the tree species and proximity to the line
- Tree/branch Failure potential
- TGR effectiveness
- The voltage of the conductor
- Sag and sway
- The Quality of the site (i.e., riparian zones, chert glades, etc.)

4.2 TREE REMOVAL

Trees less than 6 inches at Diameter at Breast Height (DBH) will be considered brush and removed from the ROW.

4.3 REMOVAL CONSIDERATIONS IN MANICURED AREAS

In areas that are being actively maintained, such as yards, Liberty or its agents shall acquire permission to remove trees from the property owner or occupant by signature. Verbal permission may be used in the event the property owner or occupant is unable to sign a removal card.

Candidates for removal:

- Trees growing in the ROW
- Fast growing trees adjacent to the ROW
- Trees growing around poles, guy wires and other equipment
- Regrowth from old stumps
- High risk trees – dead/ dying trees, root failure, canker, Insect infestation, internal decay, etc.
- Trees that cannot be pruned to ANSI A300 standards

4.4 REMOVAL CONSIDERATIONS IN NON-MANICURED AREAS

Volunteer trees in areas that lack any beneficial value shall be removed at the discretion of Liberty or its representatives. A diligent attempt will be made to inform the property owner or occupant of the removal prior to work commencement.

Candidates for removal:

- All considerations in section 4.3
- Unmarketable fencerow trees that currently lack the ability to be beneficial shade for livestock.
- Edge trees of no market value yield no additional benefit due to adjacent or otherwise available shade to livestock.
- Trees located in areas not manicured, accessible and inaccessible alleys, City and County Rights-of-Way, or not associated with a residence.

4.5 LIMB AND BRANCH DISPOSAL

4.5.1 MAINTENANCE

Liberty contract crews performing scheduled maintenance will dispose of limbs that are small enough to be fed through a chipper unless different arrangements have been made with the property owner or occupant. Wood too large to be chipped shall be cut and stacked at the site unless the homeowner requests the wood be removed before or at the time of the pruning (*See Section 3.2.2 for exception*).

4.5.2 OUTAGES

Outages caused by grow-ins will be cleaned up by Liberty contract crews. The property owner is responsible for brush and limb disposal caused by natural events including but not limited to wind, rot, whole tree failure, ice, etc.

4.5.3 MAJOR EVENTS

Liberty's primary focus during Major Events is restoration. Due to the regional impact, brush and limbs cut during major events will be left onsite.

4.6 STUMPS

Stumps will be cut as close to the ground as safely possible. All stumps shall be treated with an approved herbicide unless a property owner has requested that the stump not be treated or if the herbicide label warns against treatment of stumps in particular situations. Liberty and its contract crews will not grind out stumps unless prior arrangements have been agreed upon.

5 HERBICIDES

Herbicides are an essential component of vegetation management and an integral tool for promoting biological control on the ROW.

All herbicides shall be applied in strict compliance with all federal, state and local laws and regulations. This includes, but is not limited to application, transportation, handling and container disposal.

All herbicide and treatment methods used by the contractor shall have prior approval by Liberty.

It is the contractor's responsibility to provide all crew members applying herbicides with the appropriate protective gear, current label and Material Safety Data Sheet (MSDS) for the product being applied.

The contractor is responsible for the proper disposal or recycling of all herbicide containers.

Any spills shall be reported by the contractor's general foreman/supervisor as soon as the situation is controlled, and it is safe to do so. The type of product and amount of spillage along with the contamination efforts that were made shall be documented in an email to the Manager of Vegetation Control. Then the general foreman shall notify the proper state or federal agencies if necessary. All damage from such leaks or spills are the responsibility of the contractor.

5.1 APPLICATION

- All herbicide treatment shall be performed in a responsible manner that will reflect the best interests of the property owner and Liberty. If a property owner should object to any of the herbicide treatments, the operation shall immediately be discontinued on that property until any differences are resolved. Legitimate refusals include but are not limited to organic farming and chemical sensitivity of customers; in these instances, a recommendation for the customer to keep the area free of brush would eliminate the need for herbicide on their property.

- The Contractor shall guarantee one hundred percent (100%) coverage and a minimum ninety-five percent (95%) control per span on stumps and vegetation applied, as determined during the growing season following the treatment. Spans not meeting these specifications shall be re-treated by the Contractor at the Contractor's expense to achieve the proper mortality.

- In herbicide application work, the Contractor shall have the right to skip any portion of a line when, in the opinion of the Contractor, damage to crops, orchards, or ornamental plantings may result. Any skips shall be reported to the appropriate Liberty representative.

5.2 APPLICATION METHODS

Liberty uses multiple methods for controlling vegetation on and along its ROW. These include but are not limited to:

- **High Volume Foliar**: Applied during the growing season to the foliage of undesirable vegetation usually at 100+ gallons per acre rate

- **Low Volume Foliar** Applied during the growing season to the foliage of undesirable vegetation usually at <75 gallons per acre rate
- **Basal**: Dormant season application applied to the base of undesirable vegetation
- **Dormant Stem**: Applied to the stems of undesirable vegetation during the dormant season
- **Granular**: Applied any time of year with soil residual activity to prevent regrowth
- **Broadcast Foliar**: Foliar application during the growing season typically involving machinery. Herbicide is applied at a consistent rate over the entire area
- **Cut Stubble Application:** Brush hogging followed by broadcast selective herbicide.
- **Stump Treatment:** Stumps from removed Trees shall be treated to prevent regrowth.
- **Bare ground**: Applied to Substations and areas surrounding substations regulators, distribution 3-phase re-closers, transmission and distribution switches before vegetation emerges. No action thresholds are associated with this type of application as the intent is to keep the area free from vegetation

Methods of herbicide application are determined by site conditions, and incompatible brush heights and densities. Herbicide chemistries and application methods should match the need to treat incompatible vegetation within the ROW while limiting off-target effects to compatible vegetation.

Liberty uses multiple herbicide application methods for controlling incompatible vegetation on and along its ROW. Incompatible densities and heights are guidelines for developing appropriate work plans; however, field conditions may dictate alternative treatment methods.

		Height		
	Stocking	**Low**	**Medium**	**High**
Density	**Stems /Acre**	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000	Granular	High Volume Foliar	High Volume Foliar
		Low Volume Foliar	Basal	Basal
			Cut Stump	Cut Stump
Medium	2,000 – 5,000	Granular	Basal	High Volume Foliar
		Cut Stubble	Cut Stump	Basal
		High Volume Foliar	High Volume Foliar	Cut Stump
High	≥ 5,000	Granular	High Volume Foliar	
		Broadcast Foliar	Basal	High Volume Foliar
		Cut Stubble	Broadcast Foliar	

Table 4 Herbicide Application Method Suitability Matrix

Incompatible Brush Density	Stems / Acre	Field Analog
Low density	≤ 2,000 stems / acre	Easy to walk through in a straight line
Medium density	2,000 – 5,000 stems / acre	Possible to walk through with arms outstretched
High density	≥ 5,000 stems / acre	Not possible to walk through with arms outstretched

Table 5 Herbicide Application Method Suitability Matrix

HIGH VOLUME FOLIAR (HVF)

- Applied during the growing season to the foliage of incompatible vegetation,
- HVF is best suited to control incompatibles of medium to high-densities and heights, covering large areas of the ROW,
- High potential for drift in agricultural and culturally maintained areas,
- High potential to leave brown out on the landscape that may not be desirable in certain locations (residential, commercial, roadside, parks, historical monuments, and adjacent to National Forest lands).

		Height		
	Stocking	**Low**	**Medium**	**High**
Density	**Stems /Acre**	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 6 High Volume Foliar Suitability

LOW VOLUME FOLIAR

- Applied during the growing season to the foliage of undesirable vegetation,
- Best suited to treat small areas of low-density and low height incompatible brush,
- Desirable treatment to reduce brown out on the landscape.

		Height		
	Stocking	**Low**	**Medium**	**High**
Density	**Stems /Acre**	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 7 Low Volume Foliar Suitability

BASAL

- Applied year round but primarily during the dormant season to the bark of incompatible vegetation,
- Best suited for small areas of low-density, low to medium-high heights of incompatible brush in highly visible or environmentally sensitive areas,
- Desirable treatment to reduce brown out on the landscape, especially when implemented during fall and winter months.

		Height		
	Stocking	**Low**	**Medium**	**High**
Density	**Stems /Acre**	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 8 Basal Suitability

DORMANT STEM

- Applied during the dormant season to the bark of incompatible vegetation,
- Best suited for small areas of low to high-density, low height incompatible brush in highly visible areas,
- Desirable treatment to reduce brown out on the landscape.

		Height		
	Stocking	**Low**	**Medium**	**High**
Density	**Stems /Acre**	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 9 Dormant Stem Suitability

GRANULAR

- Applied to substations and areas surrounding substation regulators, switches and other equipment that requires access to operate on the transmission system,
- Effective treatment method to control vines on poles where foliar and basal will have limited success,
- Primarily a spot treatment, not to be used on large areas of ROW.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

SUITABILITY	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 10 Bare Ground Suitability

BROADCAST FOLIAR

- Applied during the growing season to foliage of incompatible vegetation,
- Broadcast applications typically employ broadleaf-selective chemistries,
- Best suited for large areas of high-density, low height incompatible vegetation,
- High potential for drift in agricultural and culturally maintained areas,
- High potential to leave brown out on the landscape that may not be desirable in certain locations (residential, commercial, roadside, parks, historical monuments, and adjacent to National Forest lands).

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 11 Broadcast Foliar Suitability

CUT STUBBLE

- Applied during the growing season to the stubble of incompatible vegetation that has been brush hogged,
- Broadcast applications following brush hogging typically employ broadleaf-selective herbicide chemistries,
- Best suited to control medium to high-density incompatibles with low heights that cover large areas of the ROW,
- Moderate potential for drift in agricultural and culturally maintained areas,
- Moderate potential to leave brown out on the landscape that may not be desirable in certain locations (residential, commercial, roadside, parks, historical monuments, and National Forest lands).

		Height		
	Stocking	**Low**	**Medium**	**High**
Density	**Stems /Acre**	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 12 Cut Stubble Suitability

CUT STUMP TREATMENT

- Herbicide mixtures are applied directly to the freshly cut stump surface to completely cover the cambium area,
- Best suited for small areas of low to high-density, low height incompatible brush,
- All trees removed by conventional means shall have the stump treated unless the situation conflicts with the product label or section 11.2.1.

		Height		
	Stocking	**Low**	**Medium**	**High**
Density	**Stems /Acre**	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 13 Stump Treatment Suitability

6 TREE GROWTH REGULATOR

Liberty and its agents will apply TGR on a 3-year cycle to applicable trees. TGR is a cost-effective alternative to pruning and will be the primary tool for preventing vegetative growth into energized conductors. Application methods are a Basal Drench or Probe. The main stem of the tree should be half the distance of maximum crown expansion from the conductor to be considered for application. Inches in Table 3 represent Diameter at Breast Height (DBH). Table 3 will serve as a guideline for TGR application. Field conditions may include or exclude trees from the guideline.

TGR / Trim type	Category 1	Category 2	Category 3	Category 4
Bucket ST	All	<24”	<24”	<12”
Bucket VT	All	<24”	<24”	<18”
Manual ST	All	All	<24”	<24”
Manual VT	All	All	<24”	<24”

Category 1	Sweetgum, Redbud, Bald Cypress
Category 2	Basswood, Hard Maple, Elm, Boxelder, Ailanthus
Category 3	Catalpa, Oaks, Mimosa, Hickory, Locust, Sassafras, Silver Maple,
Category 4	Birch, Gingko, Hackberry, Sycamore, Poplar, Osage Orange, Mulberry, Tulip Tree, Willow, Cottonwood

Table 14. TGR guidelines for application

7 MECHANICAL CLEARING

In areas that would be labor intensive for conventional crews to clear, mechanical clearing offers a cost-effective alternative. Liberty utilizes several types of machinery to clear vegetation along the ROW including, but not limited to boom trimmers, drumhead mowers, dozers and flail head mowers. Mechanical clearing allows access to facilities and has shown a positive impact on SAIDI numbers.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 15 Suitability Matrix for Mechanical Clearing

8 SUBSTATION VEGETATION MANAGEMENT

8.1 VEGETATION ENCROACHMENTS

During the maintenance cycle, the perimeter of the substation will be inspected for vegetation encroachments and the appropriate resource assigned to mitigate any vegetation issues, maintaining a minimum of 10' between vegetation and the substation fencing.

8.2 SUBSTATION SPRAYING

Bare ground Herbicides will be applied between February 1st and April 30th to the graveled portions of the substation to prevent vegetation from establishing inside the Substation (see Section 5 for Application guidelines). The contractor shall guarantee one hundred percent (100%) coverage with a ninety-five percent (95%) control based on square footage per Substation. Any work that does not meet these criteria shall be re-treated by the contractor at the contractor's expense. Audits will be performed during the growing season that the herbicide was applied.

9 PUBLIC EDUCATION

Liberty will host/participate yearly in multiple public outreach events including proper pruning, Right Tree-Right Place, proper planting demonstrations and energy efficient tree planting. Liberty also has brochures on tree care, tree health and maintenance available through its website. By partnering with the Arbor Day Foundation's Energy Savings Tree Program Liberty has increased awareness of Right Tree-Right Place and provides customers with information on where to plant trees for the most energy efficiency.

10 RESEARCH AND DEVELOPMENT

Liberty is committed to pursuing technology and improved methods of vegetation management that enhance reliability while reducing costs associated with vegetation management.

10.1 WIRES OVER WILDLIFE (WOW)

In this program, property owners are encouraged to maintain their portion of the ROW for vegetation that promotes wildlife while eliminating potential conflicts with the power lines. Forming a partnership with property owners will ultimately reduce Liberty's need for vegetation management.

10.2 SIDE TRIMMING WITH HERBICIDE

Liberty has pioneered an innovative delivery system that applies herbicide to the vertical wire zone to control side encroachment. Early evaluation shows a reduced cost per foot and potential increased cycle length.

10.3 AUGMENTED REALITY

Leveraging GIS to improve planning accuracy and information transfer reduces costs and improves efficiencies. Augmented Reality has multiple applications in the industry but specifically it allows the tree to become an asset that can be managed based on historical information.

10.4 TREE GROWTH REGULATORS

The benefit of a tree growth regulator has already been proven, however their application and integration into a maintenance schedule is specific to each Utility.

10.5 AUTO-MOWERS

Liberty currently deploys Autonomous Electric Mowers. These mowers will reduce maintenance costs while providing a safer and better-quality product.

10.6 POWER TO THE POLLINATORS

Liberty also provides opportunities for individuals and communities to promote pollinator habitat on the ROW and for community improvement.

10.7 RE-GROWTH STUDY

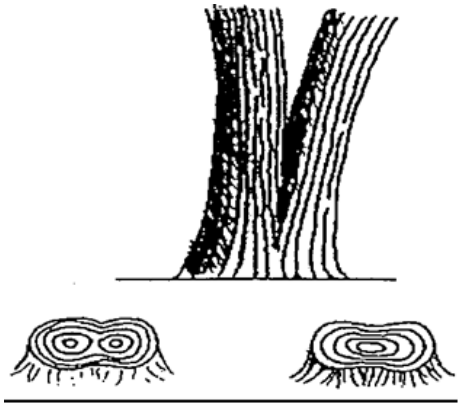
Liberty tree crews are capturing the re-growth on trees previously trimmed to determine if the clearance distances are adequate. The data capture is timestamped and georeferenced for multiple species across the system. This study will also help assess the effectiveness of TGR usage in the Vegetation Management program and how it affects the clearance specifications.

11 APPENDIX I

What is a Tree

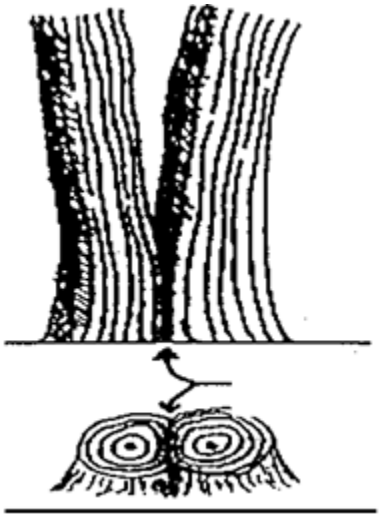
1. SINGLE-STEM TREE IDENTIFICATION

A tree that splits above ground line and has a visible included bark seam down to the ground line is considered a single tree



2. MULTI-STEM TREE IDENTIFICATION

A tree that splits at ground line is considered multiple trees. A tree that splits above ground line but has a visible included bark seam down to the ground line is considered separate trees.



TRANSMISSION VEGETATION MANAGEMENT (TVM) GUIDELINES

Liberty Utilities manages vegetation on more than 1,400 miles of Transmission Rights-of-Way in 4 states. Utilizing the Integrated Vegetation Management philosophy, Liberty Utilities performs Conventional, Mechanical and Chemical practices that promote Biological Control on and along its Rights-of-Way.

Title: Vegetation Management Guidelines for Enhanced Electrical Reliability		Author: Jason Grossman	
Distribution Vegetation Management Policy		**Revision: E**	**11/1/2018**
Revision	**Date**	**Changes**	**Approved By**
A	8/9/2008	Formalized existing documentation	McGarrah, Palmer
B	3/1/2009	Review in conjunction with our new tree trimming contracts. See letter dated Jan 30, 2009.	McGarrah, Palmer
C	3/15/2012	Annual Review – no changes.	Wallace, Penning
D	3/22/2013	Annual Review – The addition of TGR specifications. See 2.2.4 and Appendix 8.	Wallace, Penning
E	11/1/2020	Changes in standards that reflect our system's current status. Update Utility Name	Haralson, Wilson
Transmission Vegetation Management Guidelines		**Revision: F**	**01/27/2023**
Revision	**Date**	**Changes**	**Approved By**
A	01/27/2023	Formalized transmission specific version to address adoption of enhanced IVM practices that support reliability, and enhanced land use and biodiversity.	Westfall, Wilson
B	07/18/2023	Updated IVM Guidelines to include addition of: • Revision history • Transmission clearance tables • Field considerations for IVM treatments • Risks and benefits of IVM treatments • Compatible wire zone – border zone shrub list • Annual IVM training descriptions • Commitment to continuous improvement	Westfall, Wilson

Figure 1 Wire Zone - Border Zone on Liberty Utilities Transmission Right-of-Way

Approval Signatures and Dates:

DocuSigned by:
Jeff Westfall
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8/12/2023

Jeff Westfall, Senior Director, Transmission and Distribution – Central Region

DocuSigned by:
Tim Wilson
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8/8/2023

Tim Wilson, President, Central Region-Electric

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4 INTRODUCTION

The objective of Liberty Utilities' (LU) *Transmission Vegetation Management Guidelines* is to establish policies and procedures for LU vegetation management along its electrical transmission rights-of-way (ROW). LU employs integrated vegetation management (IVM) to improve reliability and to minimize risk to the public by reducing incompatible vegetation that poses a hazard to LU's electric infrastructure. LU also seeks to promote compatible plant communities that provide biological control, long-term cost savings and biodiversity on LU ROW. These guidelines shall apply to all LU electric transmission lines rated at 34.5 kV, 69 kV, 161 kV, and 345 kV.

4.1 ELECTRIC TRANSMISSION SYSTEM OVERVIEW

LU maintains approximately 1,462 transmission circuit miles that traverse southwestern Missouri (approximately 1,197 miles), southeastern Kansas (approximately 172 miles), northeastern Oklahoma (approximately 53 miles), and northwestern Arkansas (approximately 40 miles).

LU maintains transmission circuit operating voltages at 34.5 kV, 69 kV, 161 kV, and 345 kV. ROW width specifications are provided in Table 1. Given these ROW widths, LU estimates that its geographical footprint (real estate) for electric transmission, including substations, is approximately 21,000 acres. LU's transmission footprint by operating voltage is provided below in Figure 2.

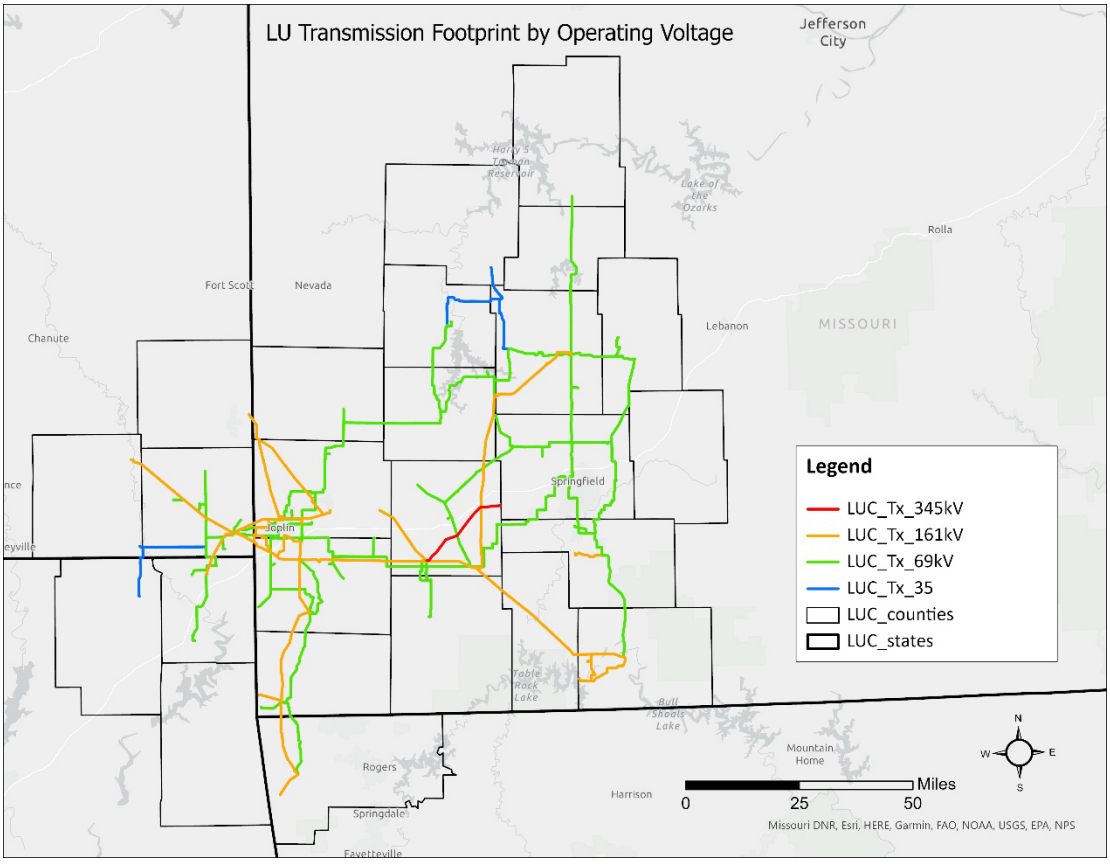

Figure 2 LU Transmission Footprint by Operating Voltage

Facility Characteristics	ROW Specifications	
Voltage Construction Type	Each Side of Facility Center	Total Width
34.5 kV Single Pole	25 feet	50 feet
34.5 kV Double Pole H-Frame	50 feet	100 feet
69 kV Single Pole	25 feet	50 feet
69 kV Double Pole H-Frame	50 feet	100 feet
161 kV Single Pole	35 feet	70 feet
161 kV Double Pole H-Frame	50 feet	100 feet
345 kV Double Pole H-Frame	75 feet	150 feet

Table 1 LU ROW Width Specifications

4.1.1 TRANSMISSION CORRIDOR ECOREGION DESCRIPTIONS[1]

LU's transmission footprint spans two US EPA Level III Ecoregions as shown in Figure 3. Descriptions of landform, vegetation composition, and dominant land uses are provided below.

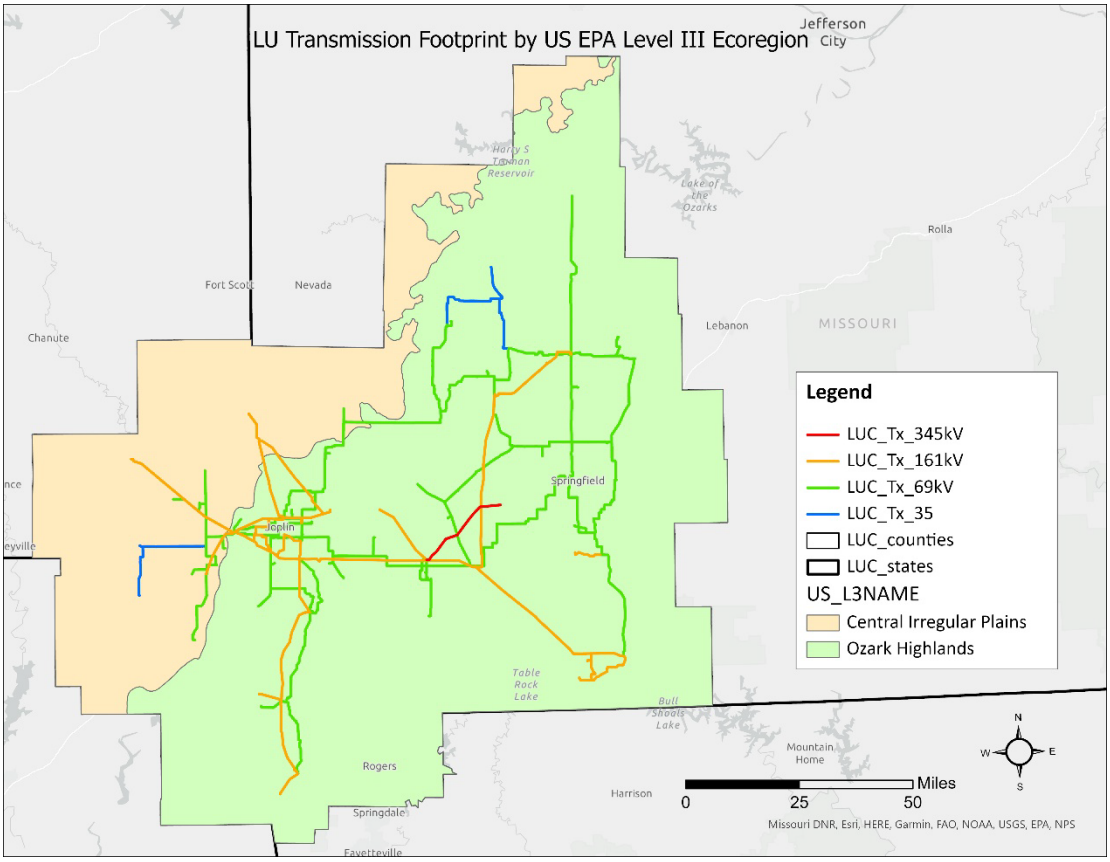

Figure 3 LU Transmission Footprint by US EPA Level III Ecoregion

[1] Ecoregions of North America

OZARK HIGHLANDS

The Ozark Highlands ecoregion has a more irregular physiography and is generally more forested than adjacent regions, with the exception of the Boston Mountains (38) to the south. Soils are mostly derived from cherty carbonate rocks. Cambrian and Ordovician dolomite and sandstone comprise the dominant bedrock in the interior of the region with Mississippian limestone underlying the western outer regions. Karst features, including caves, springs, and spring-fed streams are found throughout most of the Ozark Highlands. The majority of the region is forested; oak is the predominant forest type, but mixed stands of oak and pine are also common, with pine concentrations greatest to the southeast. Less than one fourth of the core of this region has been cleared for pasture and cropland, but half or more of the periphery, while not as agricultural as bordering ecological regions, is in cropland and pasture.

CENTRAL IRREGULAR PLAINS

The Central Irregular Plains have a mix of land use and are topographically more irregular than the Western Corn Belt Plains to the north, where most of the land is in crops. The region, however, is less irregular and less forest covered than the ecoregions to the south and east. The potential natural vegetation of this ecological region is a grassland/forest mosaic with wider forested strips along the streams compared to the north. The mix of land use activities in the Central Irregular Plains includes mining operations of high-sulfur bituminous coal.

4.1.2 TRANSMISSION CORRIDOR LAND USE – LAND COVER

LU's transmission footprint traverses a variety of land cover and use types with the majority described as developed (low, medium, and high intensities), deciduous forest, pasture and hay lands, and cultivated crops. A full land cover and use breakdown for LU's transmission footprint is provided in Table 2.

NLCD Value (2019)	NLCD Classification[2]	Approximate % of Transmission Footprint
11	Open Water	0.4%
21	Developed, Open Space	8.4%
22	Developed Low Intensity	11.5%
23	Developed, Medium Intensity	5.3%
24	Developed, High Intensity	1.8%
31	Barren Land (Rock/Sand/Clay)	0.5%
41	Deciduous Forest	17.0%
42	Evergreen Forest	0.3%
43	Mixed Forest	0.9%
52	Shrub/Scrub	0.5%
71	Grassland/Herbaceous	0.6%
81	Pasture/Hay	46.9%
82	Cultivated Crops	5.3%
90	Woody Wetlands	0.4%
95	Emergent Herbaceous Wetlands	0.1%

Table 2 National Land Cover Dataset (NLCD) 2019 Values for LU's Transmission Footprint

[2] National Land Cover Database Class Legend and Description

5 SAFETY

5.1 SAFETY REQUIREMENTS

All contractors performing work on or near LU facilities or ROW shall:

- Comply with all municipal, county, state and federal laws, rules and regulations,
- Comply with all applicable governmental safety and health regulations, and the safety and health provisions of their contract,
- Follow approved safety guidelines and procedures.

All contractors, at all times, must be aware of the nature and characteristics of LU's electric facilities before work begins. Contractors shall understand that electric facilities must remain energized during the performance of work unless special arrangements are made with an authorized LU representative.

The following procedures pertain to contractors performing vegetation management work for LU:

- The contractor shall obtain from LU full information as to the voltage of its circuits before starting the work,
- The contractor shall at all times conduct work in a manner to safeguard the public from injury and property from damage,
- The contractor must use all necessary protection for its employees and the public, and guard against interference with normal operation of the circuits. If, in the judgment of the contractor's general foreman/supervisor, it is a risk to perform their work with the circuits energized, the contractor must contact an authorized LU representative. If appropriate, LU will provide the necessary protective materials or de-energize circuits to ensure the safe pruning or removal of trees,
- Should the contractor knock down or come into contact with LU conductors (power lines), the contractor must notify LU immediately and take the necessary protective measures. All contractor-caused electric service interruptions are subject to repair at the contractor's expense. This would include any damage to customers' property, including any electrical damage,
- In the event a contractor becomes aware of any dangerous, broken, loose or faulty LU line/facilities in the normal course of its line clearance performance, the contractor shall promptly advise LU as to the exact pole location(s) and nature of the hazardous condition.

6 VEGETATION MANAGEMENT GUIDELINES

6.1 INTEGRATED VEGETATION MANAGEMENT

LU vegetation management and maintenance activities follow standards described within the American National Standards Institute (ANSI), 2018, A300: *Tree, Shrub, and Other Woody Plant Management - Standard Practices (Integrated Vegetation Management*) and the *Integrated Vegetation Management Best Management Practices 3rd Edition* (companion publication to the ANSI A300 Part 7).

LU utilizes conventional crews, mechanical clearing equipment, herbicides and tree growth regulators (TGR), and work planners to maintain its ROW. The ultimate goal of IVM on LU ROW is to develop biological control through species competition on the ROW floor and directional pruning on the ROW edge. Species competition along the floor will reduce the likelihood that tall growing incompatible woody vegetation will establish on the ROW, while directional pruning will reduce encroachments into the wire security zone by training trees to grow away from the power lines.

LU's IVM goal is to increase selective application of IVM best management practices (BMPs) to develop and maintain compatible, low-growing, wildlife-friendly vegetation communities. Aesthetic values that reduce negative external perception of IVM are also an important consideration. LU promotes IVM maintenance practices that will result in a 60/40 (grass and forb to low growing compatible woody shrub ratio) on the ROW floor. Wire zone – border zones will contribute to compatible vegetation diversity, where feasible.

LU monitors the vegetation species composition on ROW floors to gauge vegetation management effectiveness at maintaining biological control and promoting quality early-successional habitats. As a reference for habitat quality, LU aligned the development of a list of compatible grasses, forbs, and low-growing shrubs with habitat/plant lists from the Missouri Department of Conservation. LU plans to use the results of these data to inform continued improvement of its IVM program towards increasingly selective control methods that enhance biodiverse biological control on LU ROW.

LU recognizes that vegetation maintenance activities within protected areas, e.g., National Forests or Monuments, and/or ecologically sensitive areas, e.g., seasonal wetlands and stream banks, may require special considerations to avoid adverse impacts. Within protected or ecologically sensitive areas, LU vegetation maintenance activities comply with all relevant requirements for natural, cultural, historical, or archaeological resources. When performing vegetation maintenance within protected areas, like the Mark Twain National Forest, vegetation maintenance activities conform to permitting agency requirements.

IVM is an adaptive management process and LU commits to continuous improvement through a variety of initiatives. Annually, LU reviews the results of its IVM program and has engaged with the Right-of-Way Stewardship Council to continually report on and update its IVM program based on recommendations derived from the 2016 Accreditation Standards for Assessing IVM Excellence.

6.1.1 WIRE ZONE – BORDER ZONES

LU is expanding the use of wire zone – border zones on transmission ROW. Wire zone – border zones are an effective method for reducing incompatible vegetation, and for enhancing plant community composition and structure that enhance wildlife use of the ROW edge and decrease habitat fragmentation.

The following specifications describe wire zone – border zones:

- Wire zone:
  - The area directly beneath the electric conductors,
  - The wire zone is defined as 60% of the total ROW width occupying the middle of the ROW,
  - Vegetation within the wire zone is composed of low-growing compatible plant communities (≤3 feet tall at mature height) that include grasses, ferns, forbs, and very low-growing shrubs,
  - Planners may designate select species to conserve so long as they do not impede access to, or navigation within, the wire zone,
  - All incompatible woody species will be removed from the wire zone.
- Border zone:
  - The border zone is defined as 40% of the ROW width outside of the wire zone to the ROW edge,
  - Border zone vegetation is composed of wire zone vegetation plus taller-growing shrubs that will not interfere with transmission infrastructure. Examples of compatible border zone shrubs include Red Bud, Dogwood, and American Hazelnut,
  - All incompatible woody species will be removed from the border zone.

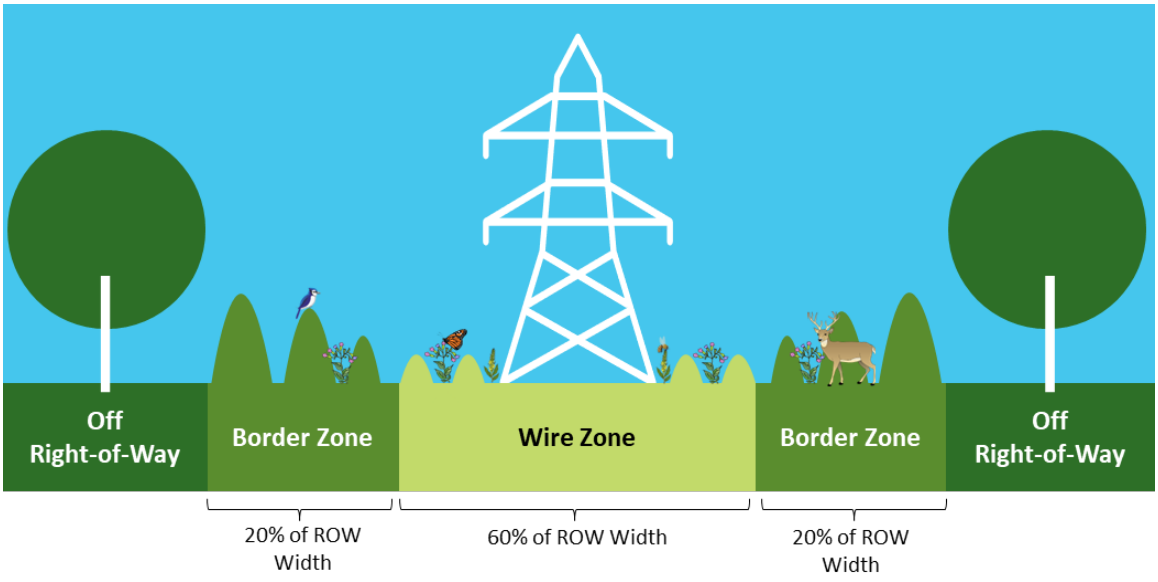

Figure 4 Cross-Sectional Diagram of a Wire Zone - Border Zone

Figure 5 Wire Zone – Border Zone on LU Transmission ROW

6.2 MAINTENANCE CYCLES

LU shall maintain a 6-year cycle for vegetation management on the transmission system.

6.3 SCHEDULING & CIRCUIT PRIORITIZATION

General scheduling of circuits for vegetation management will be based on miles. Circuits may be adjusted during the year based on the following factors:

- Reliability – circuits that have other reliability issues such as animal caused outages, equipment failures, acts of man, ability to maintain flow through the system, etc.,
- Criticality ranking – circuits that have a higher priority for restoration of emergency services,
- Connection to generation
- Interconnection - maintain stability with other Owner/Operators,
- Switching reliability – circuit preference for radial feeds or circuits that may be impacted due to construction, forced outages, etc.,
- Current vegetation conditions – current vegetation conditions on a circuit will be used to prioritize it,
- Other – additional factors that are considered when scheduling are circuit load, customer issues, workload and efficiency.

7 WORK PLANNING

Prior to vegetation maintenance, LU employs a mix of ground-level and aerial assessment methods to evaluate vegetation conditions resulting in the development of vegetation maintenance prescriptions. LU contracts a work planning service to assign resources based on the scope and type of work. Work

planning enhances the efficiency of contracted vegetation management crews. Prior to vegetation maintenance activities, work planners locate access points, notify and communicate with landowners and locate work to be performed. LU utilizes a GPS-based Electronic Workflow Management software, TerraSpectrum, that tracks planning, work completion and auditing. LU or its agents will conduct a pre-work inventory to determine the amount and types of work needed to make the circuit reliable for the length of the maintenance cycle.

Prior to work planning and implementation, LU personnel and representatives shall review Perspectives layers within TerraSpectrum to identify and understand work refusals, special notification requirements, environmentally sensitive areas, and other Perspectives that affect planning and implementation of vegetation maintenance work.

After work is completed, an audit will be performed to ensure specifications have been met. LU employs a mix of ground-level and aerial assessment methods to evaluate vegetation conditions after implementation of maintenance prescriptions.

7.1 LANDOWNER NOTIFICATIONS

7.1.1 PRIVATE PROPERTY

LU or its representatives will make a diligent attempt to notify property owners or occupants by personal contact, door hanger, or mailer. Notification shall occur seven (7) days before any work is performed, and work will occur no more than ninety (90) days after notification. A record of the date, content and address shall be maintained until the subsequent maintenance cycle has passed (6 years). If the work required is deemed an emergency due to an imminent outage, public safety issue, etc., the 7-day window will be waived, and the work shall be completed to ensure safe and reliable service and a door hanger with contact information will be left for the property owner or occupant, informing them of the situation.

7.1.2 PRIVATE PROPERTY REFUSALS

LU or its representatives will contact private landowners within 5 business days of the property owner contacting LU. If the concerns cannot be resolved through conversation, then the issue shall rise to the Coordinator responsible for the work and then to the Manager of Vegetation Management; however, under all circumstances LU maintains the right to exercise vegetation management activities as defined within the easement language.

7.1.3 COUNTY AND MUNICIPAL

LU shall provide each county and municipality a minimum of two (2) months notice for any scheduled vegetation maintenance activities. LU's Business and Community Development group maintains a list of contacts for county and municipal representatives.

7.2 VEGETATION INQUIRIES

LU will respond to requests related to tree/ROW maintenance within 5 business days. After reviewing the situation, a priority level will be assigned, and the request will be scheduled. The property owner will be informed of the results of the request. LU will decide if the work requested will benefit the overall safety and reliability of the electric system, its customers, and the general public.

7.2.1 CUSTOMER REQUESTED PRUNING

When a customer requests LU to prune a tree away from pole-to-pole lines, LU will send out a representative to make a determination of any risk. If it is determined that pruning/removal is necessary for safety or reliability, LU will schedule a crew to prune/remove the tree(s) in question.

If the tree is not a significant risk, LU will inform the customer that the tree will be re-evaluated when that circuit is scheduled for maintenance.

Service drops are the customer's responsibility. Crews will not be re-directed unless there is an immediate threat to LU facilities. However, they will be picked up on regularly scheduled maintenance.

7.2.2 CUSTOMER REQUESTED ASSISTANCE

When a customer desires to prune/remove a tree close to LU lines for reasons other than line clearance, LU will send out a representative to make a determination of any potential risk that exists. LU will do one of the following after customer notification:

- Temporarily drop the conductor while the customer or customer's agent performs the work,
- Prune or remove the portion of the tree to meet the 10' minimum Missouri Overhead Powerline Safety Act or OSHA standards whichever is greater. On Customer Requested Assistance work, limbs and branch cleanup will be the responsibility of the property owner,
- Inform the customer that the work is outside the scope of LU's responsibility, and no work will be done by LU at this time.

In all cases, the decision on which course of action to take will be determined by an LU representative after consultation with the customer.

7.3 UNAUTHORIZED USES & AREAS OF INTEREST

During the course of performing work, should LU representatives observe an unauthorized use of the ROW or an area of interest involving damage to facilities, the LU representative will immediately ensure that the scene is safe or remove themselves to a safe distance. Once safe, the LU representative will immediately contact an LU supervisor for guidance. If safe to do so, the location of the unauthorized use or area of interest should be recorded via GPS and photos should be taken to document important conditions. A follow up email shall be sent with documentation of the incident. The LU ROW Manager will report intentional, human-caused damage to local law enforcement and maintain records of the incident and incident resolution.

Examples of reportable unauthorized uses of the ROW include:

- Structures built within the ROW such as sheds, garages, deer stands (on poles or towers), etc.

Examples of reportable areas of interest include:

- Damaged electrical equipment such as broken poles, braces, crossarms, and insulators, loose guy wires, leaking transformers, and any unsafe electrical condition.

8 DEFENSE-IN-DEPTH STRATEGY & MAINTENANCE SPECIFICATIONS

8.1 DEFENSE-IN-DEPTH STRATEGY

LU adopts a defense-in-depth strategy to prevent the potential for encroachment into the conductors' flash over clearance, thus ensuring safe and reliable operation of the electric transmission system. LU's defense-in-depth strategy defines the removal or control of all incompatible vegetation within boxed ROW and within ROW containing wire zone - border zones.

8.2 ROW WIDTH SPECIFICATIONS FOR VEGETATION CONTROL

LU controls all incompatible species within the full width of the ROW. ROW width specifications for vegetation control are provided in Table 3.

Facility Characteristics	ROW Specifications	
Voltage Construction Type	Each Side of Facility Center	Total Width
34.5 kV Single Pole	25 feet	50 feet
34.5 kV Double Pole H-Frame	50 feet	100 feet
69 kV Single Pole	25 feet	50 feet
69 kV Double Pole H-Frame	50 feet	100 feet
161 kV Single Pole	35 feet	70 feet
161 kV Double Pole H-Frame	50 feet	100 feet
345 kV Double Pole H-Frame	75 feet	150 feet

Table 3 ROW Width Specification for Vegetation Control

8.3 TRANSMISSION CLEARANCE SPEFICIFATIONS

LU's transmission clearance specifications take into account defense-in-depth tolerance thresholds by operating voltage, divided into lower (34.5 kV – 69 kV) and higher (161 kV – 345 kV), and regrowth rates of incompatible species. Tables 4, 5, & 6 define transmission clearance specification for lower operating voltages. Table 7, 8, & 9 define transmission clearance specifications for high operating voltages.

8.3.1 34.5-69 KV

Category I (Fast Regrowth): 20 feet of separation minimum required	
Silver maple	Poplars
Sugar maple	Sycamore
Hackberry	Willows
Mulberry	Walnut
Locusts	Elms
Ailanthus	Sassafras
Cottonwood	

Table 4 Fast Growing Species (34.5-69 kV)

Category II (Medium Regrowth): 16 feet of separation minimum required	
Red oaks except Blackjack oak	Kentucky coffee
Pecan	Bois D'Arc (Osage orange, hedge)
Catalpa	Hickory
Red maple	Trees in moderately stressed conditions

Table 5 **Medium Growing Species (34.5-69 kV)**

Category III (Slow Regrowth): 12 feet of separation minimum required	
White oaks	Apples, pears, and other fruit trees
Blackjack oak	Ornamental dwarf tree species
Evergreens	Trees in stressed conditions

Table 6 **Slow Growing Species (34.5-69 kV)**

8.3.2 161-345 KV

Category I (Fast Regrowth): 30 feet of separation minimum required	
Silver maple	Poplars
Sugar maple	Sycamore
Hackberry	Willows
Mulberry	Walnut
Locusts	Elms
Ailanthus	Sassafras
Cottonwood	

Table 7 **Fast Growing Species (161-345 kV)**

Category II (Medium Regrowth): 25 feet of separation minimum required	
Red oaks except Blackjack oak	Kentucky coffee
Pecan	Bois D'Arc (Osage orange, hedge)
Catalpa	Hickory
Red maple	Trees in moderately stressed conditions

Table 8 **Medium Growing Species (161-345 kV)**

Category III (Slow Regrowth): 20 feet of separation minimum required	
White oaks	Apples, pears, and other fruit trees
Blackjack oak	Ornamental dwarf tree species
Evergreens	Trees in stressed conditions

Table 9 **Slow Growing Species (161-345 kV)**

8.4 INCOMPATIBLE DENSITY, HEIGHT CLASSES, & FIELD CONSIDERATIONS

In addition to terrain, access, and ROW width specifications for vegetation control, incompatible vegetation densities and heights can help to define appropriate control methods. Incompatible brush density and height tables are provided in Tables 10 and 11. Incompatible densities and heights are guidelines for developing appropriate work plans; however, field conditions may dictate alternative treatment methods. Field considerations for IVM treatment selections are described within table 12.

Incompatible Brush Density	Stems / Acre	Field Analog
Low density	≤ 2,000 stems / acre	Easy to walk through in a straight line
Medium density	2,000 – 5,000 stems / acre	Possible to walk through with arms outstretched
High density	≥ 5,000 stems / acre	Not possible to walk through with arms outstretched

Table 10 Incompatible Brush Densities

Height Class	Height
Low	≤ 8 feet
Medium	8-12 feet
High	≥ 12 feet

Table 11 Incompatible Brush Heights

Field Condition	Description	Considerations
Agricultural	Lands used for commercial agricultural crops or cattle grazing	Typically few; farmers often employ broadcast herbicides to control woody shrubs along fence rows
Residential	Culturally maintained front lawns	To reduce conflicts with property owners, consider low-volume or basal herbicide applications to reduce visual effects of brown out for homeowners
Commercial	Non-culturally maintained areas (alley ways, commercial roadsides, fence rows, etc.)	To reduce visibility of LUC vegetation maintenance, consider low-volume or basal herbicide applications to reduce visual effects of brown out to the community
Cross Country	Large open rights-of-way, fence rows	Typically few; farmers often employ broadcast herbicides to control woody shrubs along fence rows
Roadside	Non-culturally maintained or shared rights-of-way with county and state department of transportation	To reduce visibility of LUC vegetation maintenance, consider low-volume or basal herbicide applications to reduce visual effects of brown out to the community
Parks, Historical Monuments, National Forest	Often culturally maintained (at least in part) landscapes, fence rows	To reduce visibility of LUC vegetation maintenance, consider low-volume or basal herbicide applications to reduce visual effects of brown out to the community and co-managing agency

Riparian	Stream and river crossings; edges of ponds, lakes, and reservoirs	Refer to 11.3.2 Herbicide Application Near Water Sources

Table 12 Field Considerations for IVM Treatment Selection

9 CONVENTIONAL CLEARING

LU defines conventional clearing as the use of bucket trucks and manual crews. Conventional clearing is determined by site-specific conditions during the work planning process. At the time of trimming for the cycle length, trees are pruned to comply with ROW width specifications for vegetation control. LU requires all representatives and contracted crews to comply with all standards and procedures provided in ANSI-A300 *Tree, Shrub, and Other Woody Plant Management - Standard Practices (Integrated Vegetation Management*) and ANSI Z133.1 *Safety Requirements for Arboriculture Operations.*

A list of incompatible woody species and associated growth rates is provided in Table 13.

Common Name	Scientific Name	Growth Rate
Ailanthus	*Ailanthus altissima*	F
Ash, White	*Fraxinus americana L.*	F
Ash, Green	*Fraxinus pennsylvanica*	F
Basswood	*Tilia american L.*	F
Birch	*Betula nigra*	F
Black Walnut	*Juglans Nigra*	F
Boxelder	*Acer negundo*	F
Bradford Pear	*Pyrus calleryiana*	F
Buckeye	*Aesculus*	S
Catalpa	*Catalpa bignonioides*	F
Cherry	*Prunus scrotina*	F
Cottonwood	*Populus deltoides*	F
Dogwood	*Cornus florida*	S
Eastern Redcedar	*Juniperus virginiana*	S
Elm	*Ulmus sp.*	F
Ginkgo	*Ginkgo biloba*	F
Hackberry	*Celtis occidentalis*	F
Hickory	*Caryatexana sp.*	S
Honey locust	*Gleditsia triacanthos*	F
Hybrid Maples	*Acer sp.*	F
Kentucky Coffee Tree	*Gymnocladus dioica*	F
Locust	*Robinia sp.*	F
Mimosa	*Mimosa pudica*	F
Mulberry	*Morus sp.*	F
Osage Orange	*Maclura poynifera*	F
Pin Oak	*Quercus palustris*	F
Pine	*Pinus sp.*	S
Poplar	*Populus alba*	F

Post Oak	*Quercus stellata*	S
Red Bud	*Cercis canadensis*	S
Red Oak	*Quercus rubra*	S
Sassafras	*Sassafrass albidum*	F
Silver Maple	*Acer saccharinum*	F
Sugar maple	*Acer saccharum*	S
Sweetgum	*Liquidambar styraciflua*	F
Sycamore	*Platanus occidentalis*	F
White Oaks	*Quercus alba*	S

Table 13 Major Tree/Brush Species and Growth Rates (F- Fast, S- Slow)

9.1 CONSIDERATIONS FOR PRUNING

Factors to consider before pruning include, but are not limited to:

- The growth rate of the tree species and proximity to the line,
- Voltage of the conductor,
- Tree/branch failure potential,
- TGR effectiveness,
- Sag and sway,
- Site quality (e.g., riparian zones, chert glades, etc.).

9.2 LIMB AND BRANCH DISPOSAL

9.2.1 MAINTENANCE

LU contract crews performing scheduled maintenance will dispose of limbs that are small enough to be fed through a chipper unless alternative arrangements have been made with the property owner or occupant. Wood too large to be chipped shall be cut and stacked at the site unless the homeowner requests the wood be removed before or at the time of the pruning.

9.2.2 OUTAGES & MAJOR EVENTS

Outages caused by grow-ins will be cleaned up by LU contract crews. The property owner is responsible for outages caused by natural events including but not limited to wind, rot, whole tree failure, ice, etc.

LU's primary focus during major events is restoration. Due to the regional impact, brush and limbs cut during major events will be left onsite.

9.3 TREE REMOVAL

Incompatible woody species will be removed from the ROW unless otherwise specified by an LU coordinator responsible for the work.

Allowable exceptions for leaving trees or brush within the ROW include, but are not limited to:

- Trees or shrubs that can be safely maintained by the property owner,
- Slow growing trees adjacent to the ROW,
- Low-growing trees or brush that provide shade for livestock.

9.4 STUMPS

All stumps will be cut as close to the ground as safely possible. All stumps shall be treated with an approved herbicide unless a property owner has requested that the stump not be treated or if the herbicide label warns against treatment of stumps in particular situations. LU and its contract crews will not grind out stumps unless prior arrangements have been agreed upon.

10 MECHANICAL CLEARING

In areas that would be labor intensive for conventional crews to clear, mechanical clearing offers a cost-effective alternative. LU utilizes several types of machinery to clear vegetation along the ROW including, but not limited to, boom trimmers, drumhead mowers, dozers and flail head mowers. Mechanical clearing allows access to facilities and has shown a positive impact on SAIDI numbers.

A density-height suitability chart for mechanical clearing is provided in Table 14. In general, on ROW with suitable terrain and access, mechanical clearing is best suited to high incompatible brush densities and heights. Mechanical clearing can lead to aggressive re-sprouting of certain hardwood species and therefore its use should be limited to dense, tall incompatible vegetation. Incompatible densities and heights are guidelines for developing appropriate work plans; however, field conditions may dictate alternative treatment methods.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 14 **Suitability Matrix for Mechanical Clearing**

11 HERBICIDES

Herbicides are an essential component of vegetation management and an integral tool for promoting biological control on the ROW. Unlike mechanical clearing that may only temporarily reduce the height of incompatible hardwood species; over time, the selective use of herbicides reduces the density of incompatible hardwood stems on the ROW. IVM promotes the use of increasingly selective herbicide chemistries and application methods that limit off-target effects

to compatible grasses, forbs and low-growing shrubs, with the goal to establish and maintain semi-stable early successional grassland and shrub/scrub habitats.

Additionally, Goodfellow et al, 2018[3], find that mechanical and physical methods carry greater physical risks to worker safety than herbicide application methods. LUC prefers to employ herbicide application methods on the right-of-way floor when feasible to:

- Reduce risks to worker safety,
- Effectively reduce incompatible species densities, and,
- Establish low-growing, compatible vegetation communities that promote biological control by compatible grasses, forbs, and low-growing woody shrubs, where appropriate.

11.1 PLANT IDENTIFICATION TRAININGS

LU personnel and its representatives are trained in the identification in plant species (woodies, forbs, grasses, and noxious weeds) to ensure that proper application of herbicides on the right-of-way.

Annually, herbicide application and tree crews receive plant identification training through an online course and multiple in-field, hands-on training sessions. Additionally, LU personnel and its representatives have access to a plant identification smartphone application to assist within the identification of plant species in the field, as well as appropriate treatment methods and wire zone-border zone appropriateness.

A list of compatible woody wire zone-border zone shrubs is provided in table 15 below.

Common Name	Growth Zone		
	Wire Zone Suitable	Wire Zone Caution	Border Zone Suitable
Missouri Maidenbush	X		X
Coralberry		X	X
Dogwood, Roughleaf		X	X
Gooseberry, Missouri		X	X
Sumac, Fragrant		X	X
Sumac, Smooth		X	X
Sumac, Winged		X	X
Bumelia			X
Buttonbush			X
Dogwood, Flowering			X
Eastern Wahoo			X
False Indigo Bush			X
Hawthorne, Green			X
Hazelnut species			X
Hophornbeam, Eastern			X
Hornbeam, American			X
Ilex species			X

[3] The Cost-efficiency of IVM. A Comparison of Vegetation management Strategies for Utility Rights-of-.way.

Juniper, Ashe's			X
Ninebark, Eastern			X
Ozark Chinquapin			X
Pawpaw			X
Plum species			X
Redbud, Eastern			X
Sambucus species (Elderberry)			X
Spicebush			X
Viburnum species			X
White Fringetree			X
Witchhazel, American			X

Table 15 Compatible Woody Wire Zone-Border Zone Shrubs

11.2 HERBICIDE SAFETY & COMPLIANCE WITH FEDERAL LAWS

All herbicides shall be applied in strict compliance with federal, state and local laws and regulations. This includes, but is not limited to application, transportation, handling and container disposal.

All herbicides and treatment methods used by the contractor shall be approved by LU. Safety Data Sheets (SDS) shall be supplied to LU by the contractor before work begins.

It is the contractor's responsibility to provide all crew members applying herbicides with the appropriate protective gear, current label and SDS for the product being applied.

The contractor is responsible for the proper disposal or recycling of all herbicide containers.

Any spills shall be reported by the contractor's general foreman/supervisor as soon as the situation is controlled, and it is safe to do so. The type of product and amount of spillage along with a description of decontamination efforts shall be documented in an email to the Manager of Vegetation Management. Then, the general foreman shall notify the proper state or federal agencies, if necessary. All damage from such leaks or spills are the responsibility of the contractor.

11.3 HERBICIDE USE GUIDELINES

All herbicide treatments shall be performed in a responsible manner that will reflect the best interests of the property owner and LU. If a property owner should object to any of the herbicide treatments, the operation shall immediately be discontinued on that property until a resolution has been reached.

11.3.1 HERBICIDE REFUSALS

Legitimate refusals include, but are not limited to:

- Organic farming,
- Chemical sensitivity of the customer.

In these instances, a recommendation for the customer to keep the area free of brush would eliminate the need for herbicide on their property. LU maintains the right to use herbicides on private property, should a property owner refuse to manage the vegetation in accordance with LU guidelines.

11.4 HERBICIDE APPLICATION

All herbicides shall be applied in accordance with the manufacturer's label and all federal, state, and municipal laws governing the use of herbicides.

The contractor shall guarantee one hundred percent (100%) coverage and a minimum of ninety five percent (95%) control per span on stumps and vegetation, as determined during the growing season following the treatment. Spans not meeting these specifications shall be re-treated by the contractor at the contractor's expense to achieve the proper control of incompatible vegetation.

During herbicide application work, the contractor shall have the right to skip any portion of a line when, in the opinion of the contractor, damage to crops, orchards, ornamental plantings, or threats to safety may result. Any skips shall be reported to the appropriate LU representative.

11.4.1 NOXIOUS & INVASIVE SPECIES MANAGEMENT

Federal and state regulations may require the landowner to control noxious species on the ROW.

Invasive species are not federally, or state regulated; therefore, LU and contractors will treat incompatible woody invasive species and vines within LU's ROW width specifications for vegetation control or if they pose any threat to electric infrastructure. LU maintains the right to treat isolated, small areas of invasives on the ROW if large off-ROW source populations are not present and it is economical and desirable to do so.

11.4.2 HERBICIDE APPLICATION NEAR WATER SOURCES

Herbicides not registered for use in or around water shall not be applied near to any water source (stream, river, pond, reservoir). When applying herbicides near streams, rivers, ponds, or reservoirs, applicators should face away from the water source. Under no circumstance is it appropriate for herbicides to drift, drip, or spill into any water source.

11.5 HERBICIDE APPLICATION METHODS

Methods of herbicide application are determined by site conditions, and incompatible brush heights and densities. Herbicide chemistries and application methods should match the need to treat incompatible vegetation within the ROW while limiting off-target effects to compatible vegetation.

LU uses multiple herbicide application methods for controlling incompatible vegetation on and along its ROW. A summary suitability table of herbicide application methods is provided in Table 16, followed by descriptions of common herbicide methods employed by LU contract vegetation maintenance crews.

Incompatible densities and heights are guidelines for developing appropriate work plans; however, field conditions may dictate alternative treatment methods. See Table 12 for land use designations, descriptions, and considerations outlining field considerations for IVM treatment selection.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000	Granular	High Volume Foliar	High Volume Foliar
		Low Volume Foliar	Basal	Basal
			Cut Stump	Cut Stump
Medium	2,000 – 5,000	Granular	Basal	High Volume Foliar
		Cut Stubble	Cut Stump	Basal
		High Volume Foliar	High Volume Foliar	Cut Stump
High	≥ 5,000	Granular	High Volume Foliar	
		Broadcast Foliar	Basal	High Volume Foliar
		Cut Stubble	Broadcast Foliar	

Table 16 **Herbicide Application Method Suitability Matrix**

11.5.1 HIGH VOLUME FOLIAR (HVF)

- Applied during the growing season to the foliage of incompatible vegetation,
- HVF is best suited to control incompatibles of medium to high-densities and heights, covering large areas of the ROW,
- High potential for drift in agricultural and culturally-maintained areas,
- High potential to leave brown out on the landscape that may not be desirable in certain locations (residential, commercial, roadside, parks, historical monuments, and adjacent to National Forest lands).

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 17 **High Volume Foliar Suitability**

11.5.2 CUT STUBBLE

- Applied during the growing season to the stubble of incompatible vegetation that has been brush hogged,
- Broadcast applications following brush hogging typically employ broadleaf-selective herbicide chemistries,
- Best suited to control medium to high-density incompatibles with low heights that cover large areas of the ROW,
- Moderate potential for drift in agricultural and culturally-maintained areas,
- Moderate potential to leave brown out on the landscape that may not be desirable in certain locations (residential, commercial, roadside, parks, historical monuments, and National Forest lands).

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 18 **Cut Stubble Suitability**

11.5.3 BROADCAST FOLIAR

- Applied during the growing season to foliage of incompatible vegetation,
- Broadcast applications typically employ broadleaf-selective chemistries,
- Best suited for large areas of high-density, low height incompatible vegetation,
- High potential for drift in agricultural and culturally-maintained areas,
- High potential to leave brown out on the landscape that may not be desirable in certain locations (residential, commercial, roadside, parks, historical monuments, and adjacent to National Forest lands).

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 19 **Broadcast Foliar Suitability**

11.5.4 GRANULAR

- Applied to substations and areas surrounding substation regulators, switches and other equipment that requires access to operate on the transmission system,
- Effective treatment method to control vines on poles where foliar and basal will have limited success,
- Primarily a spot treatment, not to be used on large areas of ROW.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

SUITABILITY	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 20 **Bare Ground Suitability**

11.5.5 LOW VOLUME FOLIAR

- Applied during the growing season to the foliage of undesirable vegetation,
- Best suited to treat small areas of low-density and low height incompatible brush,
- Desirable treatment to reduce brown out on the landscape.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 21 **Low Volume Foliar Suitability**

11.5.6 BASAL

- Applied year round but primarily during the dormant season to the bark of incompatible vegetation,
- Best suited for small areas of low-density, low to medium-high heights of incompatible brush in highly visible or environmentally sensitive areas,
- Desirable treatment to reduce brown out on the landscape, especially when implemented during fall and winter months.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 22 **Basal Suitability**

11.5.7 DORMANT STEM

- Applied during the dormant season to the bark of incompatible vegetation,
- Best suited for small areas of low to high-density, low height incompatible brush in highly visible areas,
- Desirable treatment to reduce brown out on the landscape.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 23 **Dormant Stem Suitability**

11.5.8 CUT STUMP TREATMENT

- Herbicide mixtures are applied directly to the freshly cut stump surface to completely cover the cambium area,
- Best suited for small areas of low to high-density, low height incompatible brush,
- All trees removed by conventional means shall have the stump treated unless the situation conflicts with the product label or section 11.2.1.

		Height		
	Stocking	Low	Medium	High
Density	Stems /Acre	≤ 8 feet	8-12 feet	≥ 12 feet
Low	≤ 2,000			
Medium	2,000 – 5,000			
High	≥ 5,000			

Suitability	
Not Applicable	
Well Suited	
Marginal	
Poorly Suited	

Table 24 **Stump Treatment Suitability**

12 TREE GROWTH REGULATORS

LU and its representatives will apply TGR on a 6-year cycle to applicable trees. TGR is a cost-effective alternative to pruning. Application methods are a basal drench or probe. The main stem of the tree should be half the distance of maximum crown expansion from the conductor to be considered for application. Table 25 will serve as a guideline for TGR application. Field conditions may include or exclude trees from the guideline.

	Tree DBH			
TGR / Trim Type	Category 1	Category 2	Category 3	Category 4
Bucket ST	All	<24”	<24”	<12”
Bucket VT	All	<24”	<24”	<18”
Manual ST	All	All	<24”	<24”
Manual VT	All	All	<24”	<24”

Category 1	Sweetgum, Redbud, Bald Cypress
Category 2	Basswood, Hard Maple, Elm, Boxelder, Ailanthus
Category 3	Catalpa, Oaks, Mimosa, Hickory, Locust, Sassafras, Silver Maple
Category 4	Birch, Gingko, Hackberry, Sycamore, Poplar, Osage Orange, Mulberry, Tulip Tree, Willow, Cottonwood

Table 25 **TGR Application Guidelines**

13 SUBSTATION VEGETATION MANAGEMENT

13.1 VEGETATION ENCROACHMENTS

During the maintenance cycle, the perimeter of the substation will be inspected for vegetation encroachments and the appropriate resource assigned to mitigate any vegetation issues.

13.2 SUBSTATION SPRAYING

Bare ground herbicides will be applied in early spring to the graveled portions of the substation to prevent vegetation from establishing inside the substation (see Section 11.4.1 for application guidelines). The contractor shall guarantee one hundred percent (100%) coverage with a ninety-five percent (95%) control based on square footage per substation. Any work that does not meet these criteria shall be re-treated by the contractor at the contractor's expense. Audits will be performed during the growing season that the herbicide was applied.

14 IDENTIFICATION & MANAGEMENT OF PROTECTED AREAS & DISCRETE RTE SPECIES

14.1 PROTECTED AREAS & BIOLOGICALLY IMPORTANT AREAS

In 2020, LU conducted a biodiversity exposure evaluation of its transmission footprint for the presence of protected areas (PADUS IUCN Protected Area Categories I-VI), biologically important areas outside of protected areas (USFWS Critical Habitat), and global (IUCN Red List) and federal (USFWS Species Range) potential habitat range for rare, threatened, and endangered (RTE) species. Results of the 2020 biodiversity exposure evaluation were used to create preliminary biodiversity management plans for IUCN Protected Area Categories I-VI and GIS boundaries for these locations are provided for work planning. Figure 3 provides a high-level map of protected areas and biologically important areas within LU's transmission footprint, excluding potential habitat for RTE Species as it would not be discernable at the map scale.

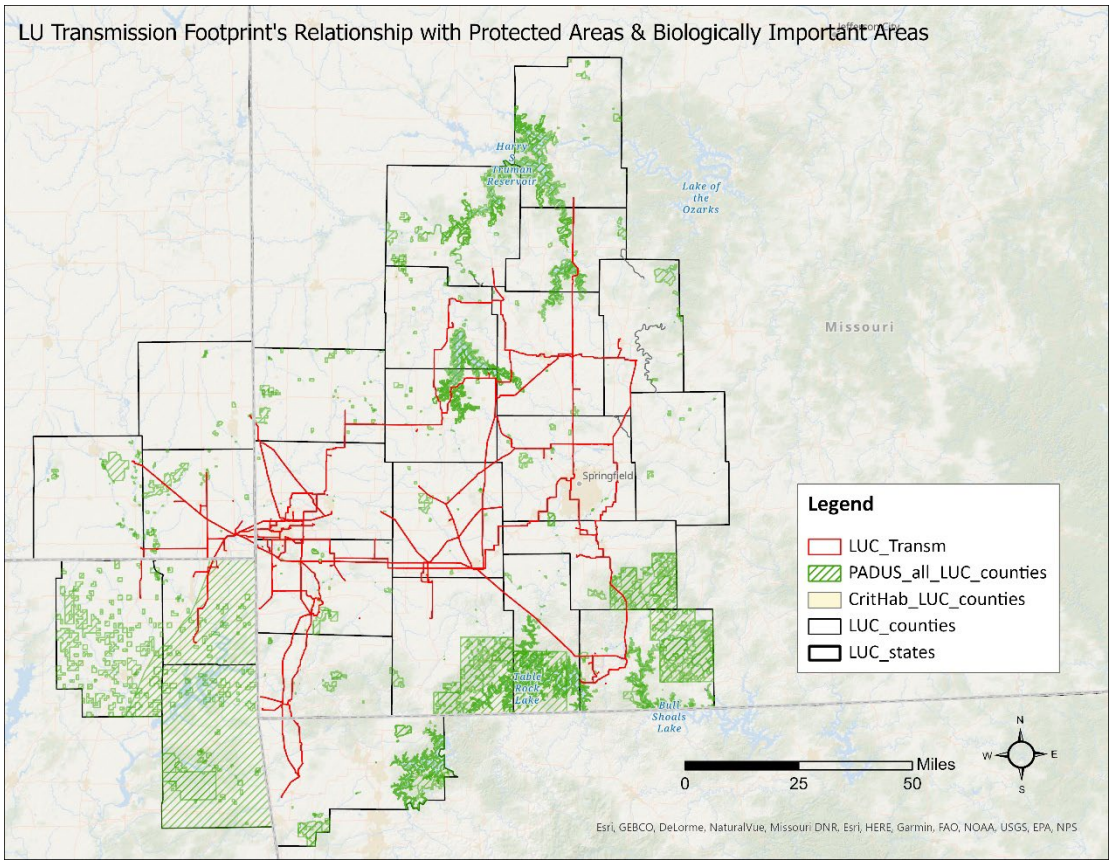

Figure 6 LU Transmission Footprint's Relationship with Protected Areas & Biologically Important Areas

14.2 RARE, THREATENED, & ENDANGERED SPECIES

As part of LU's 2020 biodiversity exposure evaluation, potential habitat for RTE species was identified. Transmission vegetation maintenance is predominantly a terrestrial activity; therefore, potential habitats for terrestrial organisms were sorted from the exposure evaluation. LU maintains this list as a reference but does not currently incorporate this information into large-scale management planning or implementation beyond normal IVM operations.

During LU's annual vegetation monitoring activities, LU representatives identify locations of RTE plant species and note them within the work planning software. Locations of discrete RTE plants species are provided to the appropriate state department of conservation and incorporated into plant identification training for protection during maintenance activities.

15 PUBLIC EDUCATION

LU will host/participate in multiple public outreach events annually including proper pruning, Right Tree, Right Place, proper planting demonstrations and energy efficient tree planting. LU also has brochures on tree care, tree health and maintenance available through its website. By partnering with the Arbor Day Foundation's Energy Savings Tree Program LU has increased awareness of Right Tree,

Right Place and provides customers with information on where to plant trees for the most energy efficiency.

16 IVM PERFORMANCE INDICATORS

LU annually reviews its annual work plan completion, budget vs expenditures, and FERC reliability metrics.

LU monitors plant communities on the ROW and uses monitoring data to inform IVM BMPs and enhancements to biodiverse biological control.

LU will continue to monitor safety, reliability, environmental, and social performance indicators to improve the performance of its TVM program.

16.1 GOVERNANCE

- Contractor risk rating:
  - Low - every regular, temporary, or part-time contractor, including sub-contractors, contracted that does not have the potential to perform a hazard risk or higher risk operation. This distinction is based on the contractor's job scope, not the size of the contract company,
  - Med/high - every regular, temporary, or part-time contractor, including sub-contractors, contracted that has the potential to perform a hazard risk or higher risk operation. This distinction is based on the contractor's job scope, not the size of the contract company,
  - Risk – the potential severity and likelihood of a physical injury incident, catastrophic operational incident, and/or serious harm to public well-being, company assets or the environment.
- FERC reliability indices:
  - System Average Interruption Duration Index (SAIDI)
  - System Average Interruption Frequency Index (SAIFI)
- Completion of annual work plan
- Budget allocation vs expenditure

16.2 ENVIRONMENTAL

- Key indicator species (milkweed and nectar-bearing forbs)
- Coefficient of conservatism
- Grass, forb, low-growing shrub ratio

16.3 SOCIAL

- Number of public outreach events hosted or participated in (pruning demonstrations, Right Tree, Right Place, proper planting demonstrations and energy efficient tree planting).
- TreeLine USA Certification
- Wildlife Habitat Council Certification

17 RESEARCH & DEVELOPMENT

LU is committed to pursuing technology and improved methods of vegetation management that enhance reliability while reducing costs associated with vegetation management.

17.1 WIRES OVER WILDLIFE (WOW)

In this program, property owners are encouraged to maintain their portion of the ROW for vegetation that promotes wildlife while eliminating potential conflicts with the power lines. Forming a partnership with property owners will ultimately reduce LU's need for vegetation management.

17.2 SIDE TRIMMING WITH HERBICIDE

LU has pioneered an innovative delivery system that applies herbicide to the vertical wire zone to control side encroachment. Early evaluation shows a reduced cost per foot and potential increased cycle length.

17.3 AUGMENTED REALITY

Leveraging GIS to improve planning accuracy and information transfer reduces costs and improves efficiencies. Augmented Reality has multiple applications in the industry but specifically it allows the tree to become an asset that can be managed based on historical information.

17.4 TREE GROWTH REGULATORS

The benefit of tree growth regulator has already been proven, however their application and integration into a maintenance schedule is specific to each Utility. LU is developing a best management practice involving pruning and treating with TGR.

17.5 AUTO-MOWERS

LU is piloting test areas for Autonomous Electric Mowers. These mowers will reduce maintenance costs while providing a safer and better-quality product.

17.6 POWER TO THE POLLINATORS

LU also provides opportunities for individuals and communities to promote pollinator habitat on the ROW and for community improvement.

17.7 RE-GROWTH STUDY

LU tree crews are capturing the re-growth on trees previously trimmed to determine if the clearance distances are adequate. The data capture is timestamped and georeferenced for multiple species across the system. This study will also help assess the effectiveness of TGR usage in the Vegetation Management program and how it affects the clearance specifications.

17.8 SATELITTLE IMAGERY ANALYSIS FOR TREE HEALTH

LU works with LiveEO to evaluate satellite imagery in the near-infrared to detect changes in tree health across our service territory over time. Detection allows LU to proactively manage for Emerald Ash Borer and hazard trees.

18 APPENDIX: FEDERAL & STATE REGULATIONS GOVERNING TVM

18.1 FEDERAL

- Federal Power Act of 1920
  - Energy Policy Act of 2005
    - US Reliability Standards:
      - NERC FAC-003-4 Transmission Vegetation Management
        - Current through: March 31st, 2024

18.2 STATE

18.2.1 OKLAHOMA:

4 CSR 240-23.010 ELECTRIC UTILITY SYSTEM RELIABILITY MONITORING AND REPORTING SUBMISSION REQUIREMENTS

- Current through:
  - No expected revision date provided.
- Contents are related to vegetation -related outage reporting and monitoring.

OKLA. ADMIN. CODE § 165:35-25-15, SECTION 165:35-25-15 - VEGETATION MANAGEMENT PLAN

- Current through:
  - November 15, 2022 (as of November ’22, a more recent version is yet to be published)
- Provisions:
  - **(a)** Vegetation management means all activities associated with the trimming, removal, or control of plant material in the proximity of energized electric utility conductors and equipment.
  - **(b)** As part of its Reliability program, each utility shall prepare an annual vegetation management plan and submit this plan to the Commission for review prior to implementation. This plan shall be an integrated part of the utility's Reliability program and shall include, but not be limited to:**(1)** Definitions of activities;
    - **(2)** Calendar of activities;
    - **(3)** Implementation plan;
    - **(4)** Criteria to assess results of the vegetation management plan; and
    - **(5)** The name and contact information of a company representative who is knowledgeable about the plan, its implementation and potential results.

- **(c)** Each utility shall, at a minimum, perform vegetation management on a 4-year cycle, unless needed otherwise or unless otherwise ordered by the Commission. The utility may request an exemption from this requirement by submitting an alternative(s) to the 4-year cycle to the Commission in its annual vegetation management plan for review and hearing.
- **(d)** Each utility shall track and record all vegetation management costs for easy identification upon Commission review.

18.2.2 ARKANSAS

- Arkansas Public Service Commission does not regulate LUC

18.2.3 KANSAS

- Kansas Corporation Commission:
  - Statutes & Regulations, Chapter 66, Public Utilities:
    - Statues relating to utility vegetation management **not found**

18.2.4 MISSOURI

- 20 CSR 4240-23.030 - Electrical Corporation Vegetation Management Standards and Reporting Requirements
  - Current through:
    - No expected revision date provided
- Provisions:
  - (2) General Provisions.
    - (A) An electrical corporation shall ensure that vegetation management is conducted in accordance with this rule along energized distribution line conductors of six hundred (600) volts and higher, that the electrical corporation owns, in whole or in part.
    - (B) Each electrical corporation shall obtain for its own employees, and shall contractually require that its contractors obtain, all required permits and licenses prior to commencement of vegetation management.
    - (C) Each electrical corporation and its contractors using chemical or biological agents in vegetation management shall comply with any laws or regulations governing the use of those biological and chemical agents.
    - (D) Each electrical corporation shall employ a vegetation manager. The vegetation manager shall supervise all aspects of the electrical corporation's vegetation management program, and shall ensure that the electrical corporation complies with this rule. The vegetation manager's name and contact information shall be posted on the electrical corporation's website and shall be included on all notifications provided pursuant to the notice requirements of section (7) of this rule.
    - (E) Each electrical corporation and its contractors shall inform workers hired to perform vegetation management of all applicable federal, state, county, and municipal laws, rules or regulations that apply to the work performed under this rule. The electrical corporation shall also ensure that all contractors comply with each applicable requirement of this rule.

- (F) An electrical corporation that agrees to perform vegetation management at the request of a municipality or government agency, other than vegetation management required under this rule, may require the requesting party to pay any cost above the electrical corporation's cost to perform the vegetation management required by this rule. An electrical corporation shall not perform such additional vegetation management if the additional vegetation management would decrease the reliability or safety of an energized conductor.
- (G) Upon an electrical corporation's receiving notice of, or having actual knowledge of, vegetation conditions that pose an imminent threat to the reliable or safe function of electrical facilities, the electrical corporation shall promptly remove or remedy the potential threat. If, pursuant to the first sentence of this section, removal of the vegetation requires the electrical corporation to access or cross property for which it does not hold an easement or other legal authorization, the electrical corporation shall make reasonable efforts to obtain any necessary permission from the property owner and remove or remedy the potential safety concern as promptly as possible.

- (3) Maintenance Cycle.
  - (A) An electrical corporation shall perform a visual inspection at least once every two (2) years of all urban energized distribution conductors and at least once every three (3) years of all rural energized distribution conductors, to determine whether vegetation management is needed. Where needed, the electrical corporation shall perform vegetation management in a timely manner. Vegetation management performed along a circuit in compliance with this rule shall meet this two (2)- or three (3)-year visual inspection requirement, accordingly.
  - (B) In addition to the maintenance required in subsection (3)(A) above, if an electrical corporation becomes aware either through notification or during the inspections required under subsection (3)(A) above or at any other time, of any vegetation close enough to pose a threat to its energized conductor, which is likely to affect reliability or safety prior to the next required vegetation management, the electrical corporation shall ensure that necessary vegetation management is promptly performed as required under section (4) of this rule.
- (4) Technical Standards for Vegetation Management.
  - (A) Each electrical corporation shall ensure that vegetation management conducted on its energized distribution conductors is performed in accordance with the following applicable standards, which are hereby incorporated by reference, include no later amendments or additions, are on file with the commission's data center and available for inspection:
    - 1. "Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush-Safety Requirements, 2006." This document, also known as ANSI Z133.1-2006, is published by the American National Standards Institute, 1819 L Street, N.W., Suite 600, Washington, DC 20036;
    - 2. Part 1 of the document entitled "Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices, 2001." This document, also

known as ANSI A300-2001, is published by the American National Standards Institute, 1819 L Street, N.W., Suite 600, Washington, DC 20036; and

- (B) Each electrical corporation shall develop its own vegetation management standards, guidelines and procedures, which shall be consistent with this rule. In developing these standards, guidelines and procedures, an electrical corporation shall prioritize its vegetation management based upon:
    - 1. The extent of the potential for vegetation to interfere with the energized conductor;
    - 2. The voltage of the affected energized conductor; and
    - 3. The relative importance of the affected energized conductor in maintaining safety and reliability.
- (C) Each electrical corporation shall file a copy of its vegetation management standards, guidelines and procedures at the commission by July 1, 2008, with verification by affidavit of an officer who has knowledge of the matters stated therein. If an electrical corporation makes a change in its vegetation management standards, guidelines or procedures, it shall file a copy of the change at the commission no later than thirty (30) days prior to implementing the change, with verification by affidavit of an officer who has knowledge of the matters stated therein.
- (D) Each electrical corporation's vegetation management standards, guidelines and procedures shall cover, at a minimum, all of the following activities:
    - 1. Tree pruning and removal;
    - 2. Vegetation management around poles, substations and energized conductors;
    - 3. Manual, mechanical, biological or chemical vegetation management along rights-of-way;
    - 4. Inspection of areas where vegetation management is performed, both before and after the vegetation management;
    - 5. Research and development of improved vegetation management; and
    - 6. Public education.
- (E) Among the factors the electrical corporation shall consider in determining the extent of vegetation management to be performed at a particular site are:
    - 1. The rate at which each species of vegetation is likely to grow back;
    - 2. The voltage of the energized conductor, with higher voltages requiring larger clearances;
    - 3. Sag of conductors at elevated temperatures and under wind and ice loading, and growth habit, strength, and health of vegetation growing adjacent to the conductor with the combined displacement of the vegetation, supporting structures, and conductors under adverse weather or routine wind conditions; and
    - 4. The electrical corporation's legal rights to access the area where vegetation management is to be performed.
- (F) The electrical corporation shall remove all trimmings and cut vegetation resulting from vegetation management that are part of the electrical

corporation's regular maintenance cycle, within five (5) business days after the vegetation was cut, except if:

- 1. The electrical corporation obtains consent from the owner of the property upon which the trimmings or cut vegetation are located to leave the trimmings or cut vegetation; or
- 2. The vegetation management is performed as a direct result of an outage caused by a storm as described in the electrical corporation's standard procedures. The electrical corporation shall include a copy of its standard procedures regarding removal of trimmings or cut vegetation during outages caused by a storm in its annual vegetation management filing. If the electrical corporation proposes to change its standard procedures regarding removal of trimmings or cut vegetation during outages caused by a storm, the electrical corporation shall file the proposed changes with the commission, and other parties shall have thirty (30) days to comment on the proposed changes.

- (5) Transmission Line Vegetation Management. Every electrical corporation shall send the commission's energy department a copy of every filing it makes on vegetation management of its transmission lines with the FERC, a regional reliability organization, or the NERC.
- (6) Training, Record Keeping and Reporting.
  - (A) Each electrical corporation shall adopt standards to be used by all persons who perform vegetation management for the electrical corporation, whether employees or contractors, for the proper care of trees and other woody plants, including safety practices and line clearance techniques.
  - (B) The electrical corporation shall monitor and document all scheduled vegetation management and related activities it or its contractors performs. Documentation shall include, but shall not be limited to:
    - 1. Identification of each circuit and substation where vegetation management was performed;
    - 2. The type of vegetation management performed including removal, trimming and spraying and methods used;
    - 3. The crew size and supervisor's name;
    - 4. The date of activity;
    - 5. Any safety hazards encountered; and
    - 6. Any unexpected occurrence or accident resulting in death, life-threatening or serious injury to a person assigned to perform vegetation management activities or the public;
  - (C) Each electrical corporation shall include a summary of the information required in subsection (6)(B) above about its vegetation management during the past year, and vegetation management planned for the following year in an annual report to be filed with the commission by April 1 each year, with verification by affidavit of an officer who has knowledge of the matters stated therein. The report shall also include:
    - 1. Expenditures for vegetation management in the preceding year;
    - 2. Vegetation management budget for the current year;
    - 3. Circuits, completion dates and miles trimmed in the preceding year;

        - 4. Circuits, completion dates and miles scheduled for the current year; and
        - 5. Total distribution miles for the system and corresponding classification between rural and urban.
    - (D) Each electrical corporation shall report its own violations of this rule to the commission within thirty (30) days of discovery and include its plan for correcting the violation.
    - (E) The staff of the commission shall review each electrical corporation's vegetation management annual report for compliance with the provisions of this rule. The staff shall identify any deficiencies in the annual report of each electrical corporation and file its analysis and recommendations for each electrical corporation complying with the provisions of this rule.
    - (7) Public Notice of Planned Vegetation Management.
        - (A) Each electrical corporation shall make a diligent attempt to notify all property owners or occupants that may be affected by planned vegetation management. This requirement will be satisfied if the electrical corporation provides notice to affected property owners or occupants at least seven (7) days, but not more than ninety (90) days, prior to performing planned vegetation management activity. Notice shall be provided by direct mailing, door hanger, postcard, bill insert, personal contact or any other commission-approved method.
        - (B) Each electrical corporation shall maintain a record of the dates, content, and addresses to which all notices provided under subsection (7)(A) were given until the subsequent vegetation management cycle has occurred for each affected property owner or occupant.
    - (C) Each electrical corporation or its contractor shall provide written notice of any pending vegetation management activities to a primary contact for each county and municipality affected. The primary contact shall be selected by mutual agreement between the electrical corporation and the highest elected official, or if no elected official, then the highest appointed official, of the county and municipality.
    - (D) An electrical corporation shall notify counties and municipalities that may be affected by vegetation management activities. The notice shall be made in writing to the primary contact designated under subsection (7)(C) above, at least two (2) months in advance of the planned vegetation management. This notice shall include the planned dates and locations of the vegetation management. In addition, the notice of vegetation management shall be in a form appropriate to each electrical corporation's procedures and easement rights.
- (8) Outreach Programs.
    - (A) Each electrical corporation shall conduct an annual public education program to inform its customers, as well as the political subdivisions in the electrical corporation's service territory, of the importance of vegetation management, and of the electrical corporation's role and responsibility in managing vegetation near electric lines.

- (B) The public education program required under this section shall be implemented by direct mail or another method approved by the commission.
- (C) Each electrical corporation shall post its public education materials on its website.

- (9) Specific Requirements.
  - (A) Each electrical corporation shall perform vegetation management in accordance with this rule as follows:
    - 1. On no less than fifteen percent (15%) of its total urban distribution miles by the twelve (12) month anniversary of the effective date of this rule, and on no less than fifteen percent (15%) of its total rural distribution miles by the eighteen (18) month anniversary of the effective date of this rule;
    - 2. On no less than forty percent (40%) of its total urban distribution miles by the twenty-four (24) month anniversary of the effective date of this rule, and on no less than forty percent (40%) of its total rural distribution miles by the thirty-six (36) month anniversary of the effective date of this rule;
    - 3. On no less than seventy percent (70%) of its total urban distribution miles by the thirty-six (36) month anniversary of the effective date of this rule, and on no less than seventy percent (70%) of its total rural distribution miles by the fifty-four (54) month anniversary of the effective date of this rule;
    - 4. On no less than one hundred percent (100%) of its total urban distribution miles by the four (4) year anniversary of the effective date of this rule, and on no less than one hundred percent (100%) of its total rural distribution miles by the six (6) year anniversary of the effective date of this rule; and
    - 5. Thereafter, on no less than twenty-five percent (25%) of its total urban distribution miles each year, and on no less than twenty-five percent (25%) of its total rural distribution miles each eighteen (18) months.
  - (B) To the extent permitted by current easements or other authority, each electrical corporation must maintain the following minimum clearances of vegetation from conductors at the time vegetation management is conducted:
    - 1. For conductors energized above fifty thousand (50,000) volts, fifteen feet (15') or the edge of the right of way, whichever is less;
    - 2. For conductors energized at six hundred (600) through fifty thousand (50,000) volts, ten feet (10') or the edge of the right of way, whichever is less;
    - 3. Subtransmission lines and three (3)-phase distribution feeders/backbone circuits (portion of distribution system directly interconnected with distribution substation and prior to the first protective device) shall be trimmed vertically to remove overhanging limbs to the widths prescribed in paragraphs (9)(B)1. and (9)(B)2. above;

- 4. Notwithstanding any provision to the contrary in this section (9), for conductors energized at or below thirty-five thousand (35,000) volts, mature trees whose trunks or limbs have sufficient strength and rigidity to prevent the trunk or limbs from damaging the conductor under reasonably foreseeable wind and weather conditions are exempt from the minimum clearance requirements in this section (9); and
- 5. The radial clearances in subsection (9)(B) are minimum clearances that should be established between the vegetation and the energized conductors and associated live parts where practicable. Vegetation management practices may make it advantageous to obtain greater clearances than those listed. In the event that the specific trimming conflicts with any other materials within this chapter the strictest rules shall apply.

- (10) In the event an electrical corporation incurs expenses as a result of this rule in excess of the costs included in current rates, the corporation may submit a request to the commission for accounting authorization to defer recognition and possible recovery of these excess expenses until the effective date of rates resulting from its next general rate case, filed after the effective date of this rule, using a tracking mechanism to record the difference between the actually incurred expenses as a result of this rule and the amount included in the corporation's rates, or if there is no identifiable amount included in the corporation's rates, the amount reflected in the appropriate uniform system of accounts account for vegetation management on the corporation's books for the test year (as updated) from the corporation's last rate case will be used to determine the amount included in current rates. In the event that such authorization is granted, the next general rate case must be filed no later than five (5) years after the effective date of this rule. Parties to any electrical corporation request for accounting authorization pursuant to this rule may ask the commission to require the electrical corporation to collect and maintain data (such as actual revenues and actual vegetation management expenses) until such time as the commission addresses ratemaking for the deferrals. The commission will address the ratemaking of any costs deferred under these accounting authorizations at the time the electrical corporation seeks ratemaking in a general rate case.
- (11) Variances. A variance from a provision of this rule may be granted only for good cause shown. Nothing in this rule shall prevent an electrical corporation from proposing and the commission from approving an alternative vegetation management plan in variance of paragraphs (9)(B)1. and 2., if the electrical corporation can establish that the alternative vegetation management plan has previously produced greater reliability performance than would be produced under this rule or that the alternative vegetation management plan shall produce greater reliability performance in the future than would be produced under this rule.

18.3 MUNICIPAL

As of November ’22, municipal regulations governing bulk electric transmission are undefined.

Name NERC Transmission Vegetation Management Program	Version No. J
Owner Jason Grossman, Manager of Vegetation Management	Effective date 4/1/24
Approver Jeff Westfall, Senior Director, Transmission and Distribution - Central Region	Next review date 4/1/25
Tim Wilson, President, Central Region-Electric	Last approval date 12/6/22

1. **R1 (FAC-003-5 R3)**

   This Document provides strategies and goals to reduce the risk of vegetation related outages on NERC regulated lines. Strategies lined out in this document are designed to manage vegetation to distances beyond the Minimum Vegetation Clearance Distance (MVCD) to ensure no encroachment into the MVCD. The MVCD is defined by FAC-003-4, Table 1 (see Appendix I). Liberty will provide evidence that it managed vegetation to prevent encroachment into the MVCD (See R3).

2. **R2. [Reserved for Future Use]**

3. **R3 Vegetation Management Strategy (FAC-003-5 R3)**

   Liberty will manage all vegetation with potential growth into the MVCD (Appendix I) to the full width of the Right Of Way (ROW) on a six year cycle. Annual ground patrol and aerial inspections will be used to monitor the conditions on and off the ROW. Any Vegetation observed that presents an elevated risk of encroachment into the MVCD prior to the subsequent cycle shall be addressed appropriately and documented for record keeping (See Annual Vegetation Work Plan for more details). Conditions to be considered for an elevated risk of encroachment will take into account sag of the lines (Appendix II), sway of the lines (Appendix III), vegetation growth rates, frequency of inspections and control methods. Liberty will use an Integrated Vegetation Management approach including but not limited to: mechanical trimming, mechanical mowing, conventional bucket crews, tree growth regulators, herbicide applications, and biological control in order to promote plant diversity. Resources will be allocated as determined by the Vegetation Management Supervisor. 100% of the Annual Work Plan shall be completed within the year it is generated to ensure no vegetation encroaches into the MVCD. Annual aerial patrol will help confirm completion of work. Any work that cannot be confirmed by aerial patrol will be verified by a ground patrol. Any modifications in response to changing conditions will be documented and a final Amended Vegetation Work Plan will be kept for documentation. All additional work added will be verified upon completion.

4. **R4 Potential Fault Caused by Vegetation (FAC-003-5 R4)**

   If Liberty confirms a vegetation condition that is likely to cause a Fault at any moment, the individual on site shall contact Liberty Operations Center that holds authority for the line, who, in turn shall notify Transmission Operator or the Generation Operator that holds the switching authority for the 345kV line, immediately and without delay to inform them of the situation and to

determine necessary steps to avoid an unintended outage (See Appendix V). A follow up email shall be sent to the Area Manager and the Vegetation Management Supervisor with all pertinent information. Documentation of the notification shall be retained for records. Appropriate resources will be redirected to mitigate the condition once the situation is deemed safe. The Vegetation Management Supervisor will assess the site for other potential threats with the appropriate remediation actions taken.

5. **R5 Known Potential Fault (FAC-003-5 R5)**

   In the event Liberty is constrained from performing vegetation management that could lead to an encroachment into the MVCD prior to the subsequent cycle, the Vegetation Management Supervisor shall be made aware of the condition by phone with a follow up email detailing the situation. If the condition cannot be remediated through conventional means with the property owner, documentation of the constraint shall be made for records and an alternative path of remediation shall be pursued up to and including de-rating of the line through Engineering and System Operations Department. All ensuing constraints shall also be documented until the situation is resolved with the risk reduced to an acceptable level.

6. **R6 Vegetation Inspection Frequency (FAC-003-5 R6)**

   Liberty will conduct an annual Aerial Patrol of the applicable transmission lines once per calendar year with less than 18 months in between patrols. A work plan will be generated as verification of patrol, even in the absence of any encroaching vegetation. Ground Patrols will be conducted on all lines scheduled for maintenance and on an as needed basis determined by the Vegetation Management Supervisor. In the event that the Aerial Patrol is unable to complete 100% of the inspection, a ground survey will be scheduled to complete the remainder of the applicable lines.

7. R7 Annual Vegetation Work Plans (FAC-003-5 R7)

Annual Work plans for vegetation shall be generated based on the Aerial Patrol, any ground patrols and/or LiDAR. A thorough ground inspection shall be conducted during the scheduled maintenance cycle. 100% of the Annual Work Plan shall be completed within the year it is generated to ensure no vegetation encroaches into the MVCD. Annual aerial patrol will help confirm completion of work. Any work that cannot be confirmed by aerial patrol will be verified by a ground patrol. Any modifications in response to changing conditions will be documented and a final Amended Vegetation Work Plan will be kept for documentation. All additional work added will be verified upon completion.

Appendix I

Minimum Vegetation Clearance Distance

Nominal AC System Voltage (kV)	MVCD at 1.0 Gap Factor (feet)														
	Sea Level up to 500 ft	Over 500 ft up to 1,000 ft	Over 1,000 ft up to 2,000 ft	Over 2,000 ft up to 3,000 ft	Over 3,000 ft up to 4,000 ft	Over 4,000 ft up to 5,000 ft	Over 5,000 ft up to 6,000 ft	Over 6,000 ft up to 7,000 ft	Over 7,000 ft up to 8,000 ft	Over 8,000 ft up to 9,000 ft	Over 9,000 ft up to 10,000 ft	Over 10,000 ft up to 11,000 ft	Over 11,000 ft up to 12,000 ft	Over 12,000 ft up to 13,000 ft	Over 13,000 ft up to 14,000 ft
765	11.6	11.7	11.9	12.1	12.2	12.4	12.6	12.8	13.0	13.1	13.3	13.5	13.7	13.9	14.0
500	7.0	7.1	7.2	7.4	7.5	7.6	7.8	7.9	8.1	8.2	8.3	8.5	8.6	8.8	8.9
345	4.3	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6
287	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.1	6.2	6.3	6.4	6.5	6.6	6.7
230	4.0	4.1	4.2	4.3	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3
161	2.7	2.7	2.8	2.9	2.9	3.0	3.0	3.1	3.2	3.3	3.3	3.4	3.5	3.6	3.6
138	2.3	2.3	2.4	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.8	2.9	3.0	3.0	3.1
115	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.6
88	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1
69	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5

Table 1 – Table of MVCD values at a 1.0 gap factor (in U.S. customary units)

For the 345kV line, EDE operates between 1000-2000ft above Sea Level. At this altitude the MVCD is **4.4 ft.**

Appendix II

Sag Calculations

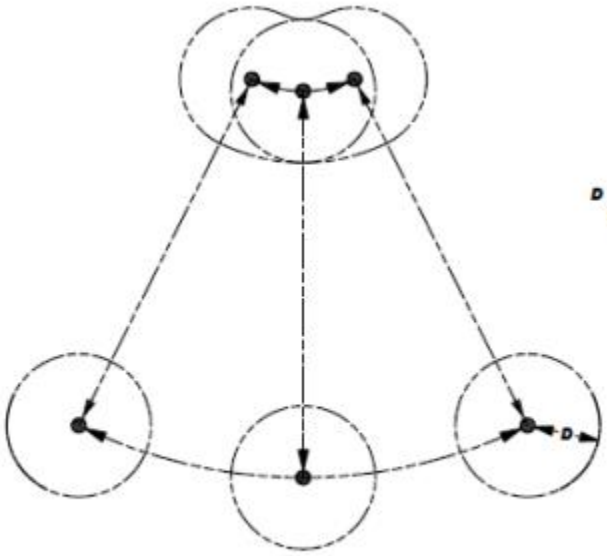

Figure 1

Sag*= ((Span Length ft^2)/(892 ft^2) x 25.21ft

** measured at 167^{O}F, the sag for an 892ft conductor was 25.21ft*

Appendix III

Sway Calculations for maximum Sag on Brookline-Monnet 345kV Line

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
AEC322	EDE1	737	47.17	4.4	51.57			
EDE1	EDE2	1037	59.62	4.4	64.02			
EDE2	EDE3	877	49.31	4.4	53.71			
EDE3	EDE4	670	41.14	4.4	45.54			
EDE4	EDE5	801	49.29	4.4	53.69			
EDE5	EDE6	713	43.85	4.4	48.25			
EDE6	EDE7	720	44.31	4.4	48.71			
EDE7	EDE8	969	57.03	4.4	61.43			
EDE8	EDE9	679	46.41	4.4	50.81			
EDE9	EDE10	670	45.01	4.4	49.41			
EDE10	EDE11	635	43.81	4.4	48.21			
EDE11	EDE12	864	50.12	4.4	54.52			
EDE12	EDE13	766	46.08	4.4	50.48			
EDE13	EDE14	901	53.44	4.4	57.84			
EDE14	EDE15	885	52.95	4.4	57.35			
EDE15	EDE16	930	54.8	4.4	59.2			
EDE16	EDE17	732	47.36	4.4	51.76			
EDE17	EDE18	936	55.46	4.4	59.86			
EDE18	EDE19	904	54.4	4.4	58.8			
EDE19	EDE20	647	42.69	4.4	47.09			
EDE20	EDE21	753	45.95	4.4	50.35			
EDE21	EDE22	875	52.78	4.4	57.18			
EDE22	EDE23	790	49.08	4.4	53.48			
Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
EDE23	EDE24	788	49.58	4.4	53.98			

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
EDE24	EDE25	949	56.31	4.4	60.71			
EDE25	EDE26	759	47.84	4.4	52.24			
EDE26	EDE27	908	53.74	4.4	58.14			
EDE27	EDE28	882	53.39	4.4	57.79			
EDE28	EDE29	853	51.98	4.4	56.38			
EDE29	EDE30	915	54.45	4.4	58.85			
EDE30	EDE31	739	47.72	4.4	52.12			
EDE31	EDE32	876	52.45	4.4	56.85			
EDE32	EDE33	745	47.46	4.4	51.86			
EDE33	EDE34	923	54.44	4.4	58.84			
EDE34	EDE35	813	50.48	4.4	54.88			
EDE35	EDE36	763	48.84	4.4	53.24			
EDE36	EDE37	852	51.48	4.4	55.88			
EDE37	EDE38	1022	58.92	4.4	63.32			
EDE38	EDE39	914	54.7	4.4	59.1			
EDE39	EDE40	934	55.78	4.4	60.18			
EDE40	EDE41	720	45.79	4.4	50.19			
EDE41	EDE42	505	37.65	4.4	42.05			
EDE42	EDE43	631	41.96	4.4	46.36			
EDE43	EDE44	915	54.44	4.4	58.84			
EDE44	EDE45	820	51.1	4.4	55.5			
EDE45	EDE46	766	49.23	4.4	53.63			
EDE46	EDE47	1054	61.18	4.4	65.58			
EDE47	EDE48	544	41.26	4.4	45.66			
EDE48	EDE49	1054	59.76	4.4	64.16			
EDE49	EDE50	738	47.53	4.4	51.93			
EDE50	EDE51	828	50.84	4.4	55.24			
EDE51	EDE52	834	51.08	4.4	55.48			
EDE52	EDE53	900	54.03	4.4	58.43			
EDE53	EDE54	900	53.84	4.4	58.24			
EDE54	EDE55	800	49.93	4.4	54.33			
EDE55	EDE56	752	48.2	4.4	52.6			

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
EDE56	EDE57	813	50.72	4.4	55.12			
EDE57	EDE58	954	56	4.4	60.4			
EDE58	EDE59	381	38.13	4.4	42.53			
EDE59	EDE60	925	50.8	4.4	55.2			
EDE60	EDE61	680	41.7	4.4	46.1			
EDE61	EDE62	989	57.6	4.4	62			
EDE62	EDE63	730	47.14	4.4	51.54			
EDE63	EDE64	1170	66.84	4.4	71.24			
EDE64	EDE65	800	50.05	4.4	54.45			
EDE65	EDE66	526	41.47	4.4	45.87			
EDE66	EDE67	1000	58	4.4	62.4			
EDE67	EDE68	900	53.38	4.4	57.78			
EDE68	EDE69	956	56.22	4.4	60.62			
EDE69	EDE70	960	56.51	4.4	60.91			
EDE70	EDE71	718	46.89	4.4	51.29			
EDE71	EDE72	942	55.39	4.4	59.79			
EDE72	EDE73	900	53.69	4.4	58.09			
EDE73	EDE74	851	51.53	4.4	55.93			
EDE74	EDE75	885	53.1	4.4	57.5			
EDE75	EDE76	1094	62.42	4.4	66.82			
EDE76	EDE77	833	47.4	4.4	51.8			
EDE77	EDE78	769	45.13	4.4	49.53			
EDE78	EDE79	945	55.35	4.4	59.75			
EDE79	EDE80	944	55.69	4.4	60.09			
EDE80	EDE81	756	48.19	4.4	52.59			
EDE81	EDE82	804	50.1	4.4	54.5			
EDE82	EDE83	1206	68.72	4.4	73.12			
EDE83	EDE84	948	55.56	4.4	59.96			
EDE84	EDE85	816	50.4	4.4	54.8			
EDE85	EDE86	848	51.72	4.4	56.12			
EDE86	EDE87	830	50.97	4.4	55.37			

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
EDE87	EDE88	821	50.67	4.4	55.07			
EDE88	EDE89	814	50.49	4.4	54.89			
EDE89	EDE90	900	53.72	4.4	58.12			
EDE90	EDE91	821	50.8	4.4	55.2			
EDE91	EDE92	744	47.48	4.4	51.88			
EDE92	EDE93	840	51.06	4.4	55.46			
EDE93	EDE94	866	52.09	4.4	56.49			
EDE94	EDE95	912	50.64	4.4	55.04			
EDE95	EDE96	721	43.37	4.4	47.77			
EDE96	EDE96A	422	39.1	4.4	43.5			
EDE96A	EDE97	508	41.57	4.4	45.97			
EDE97	EDE98	830	50.93	4.4	55.33			
EDE98	EDE99	651	44.32	4.4	48.72			
EDE99	EDE100	933	55.4	4.4	59.8			
EDE100	EDE101	867	53.01	4.4	57.41			
EDE101	EDE102	798	50.02	4.4	54.42			
EDE102	EDE103	1066	60.44	4.4	64.84			
EDE103	EDE104	554	41.16	4.4	45.56			
EDE104	EDE105	598	43.9	4.4	48.3			
EDE105	EDE106	1360	78.33	4.4	82.73	78	484	495
EDE106	EDE107	641	44.25	4.4	48.65			
EDE107	EDE108	1398	76.49	4.4	80.89	85	541	594
EDE108	EDE109	671	42.52	4.4	46.92			
EDE109	EDE110	600	43.66	4.4	48.06			
EDE110	EDE111	707	46.67	4.4	51.07			
EDE111	EDE112	1069	61.57	4.4	65.97			
EDE112	EDE113	880	52.72	4.4	57.12			
EDE113	EDE114	584	42.71	4.4	47.11			
EDE114	EDE115	906	54.42	4.4	58.82			
EDE115	EDE116	904	53.81	4.4	58.21			
EDE116	EDE117	704	45.43	4.4	49.83			

EDE117	EDE118	922	54.72	4.4	59.12			
EDE118	EDE119	1398	81.3	4.4	85.7	83	443	438
EDE119	EDE120	650	44.53	4.4	48.93			
EDE120	EDE121	300	35.11	4.4	39.51			
EDE121	EDE122	948	55.27	4.4	59.67			
EDE122	EDE123	1403	81.6	4.4	86	72	434	434
EDE123	EDE124	764	48.64	4.4	53.04			
EDE124	EDE125	908	53.1	4.4	57.5			
EDE125	EDE126	675	45.43	4.4	49.83			
EDE126	EDE127	736	47.75	4.4	52.15			
EDE127	EDE128	1015	58.95	4.4	63.35			
EDE128	EDE129	348	37.71	4.4	42.11			
EDE129	EDE130	1142	64.77	4.4	69.17			
EDE130	EDE131	926	54.98	4.4	59.38			
EDE131	EDE132	831	50.96	4.4	55.36			
EDE132	EDE133	452	39.81	4.4	44.21			
EDE133	EDE134	1084	62.33	4.4	66.73			
EDE134	EDE135	496	39.51	4.4	43.91			
EDE135	EDE136	472	39.09	4.4	43.49			
EDE136	EDE137	975	51.19	4.4	55.59			
EDE137	EDE138	1042	53.86	4.4	58.26			
EDE138	CU Line	682	41.76	4.4	46.16			

Appendix IV

Sway Calculations for maximum Sag on Neosho Ridge 345kV Line

START Str #	END Str #	Span (ft)	Max Blowout Offset from Centerline (90 mph)	Minimum Vegetation Clearance Distance (ft) per NERC FAC-003	TOTAL (ft)
Collector Sub	1	114	34.78	4.4	39.18
1	2	750	23.93	4.4	28.33

2	3	801	32.78	4.4	37.18
3	4	744	23.75	4.4	28.15
4	5	583	18.47	4.4	22.87
5	6	742	30.51	4.4	34.91
6	7	770	31.89	4.4	36.29
7	8	793	32.92	4.4	37.32
8	9	674	27.77	4.4	32.17
9	10	731	30.07	4.4	34.47
10	11	808	33.56	4.4	37.96
11	12	728	30.04	4.4	34.44
12	13	729	29.97	4.4	34.37
13	14	700	28.78	4.4	33.18
14	15	674	27.78	4.4	32.18
15	16	692	28.43	4.4	32.83
16	17	597	18.77	4.4	23.17
17	18	607	19.53	4.4	23.93
START Str #	END Str #	Span (ft)	Max Blowout Offset from Centerline (90 mph)	Minimum Vegetation Clearance Distance (ft) per NERC FAC-003	TOTAL (ft)
18	19	738	31.03	4.4	35.43
19	20	735	31.04	4.4	35.44
20	21	606	25.75	4.4	30.15
21	22	649	27.37	4.4	31.77
22	23	567	24.32	4.4	28.72
23	24	603	25.55	4.4	29.95

24	25	570	18.33	4.4	22.73
25	26	431	15.96	4.4	20.36
26	27	440	21.58	4.4	25.98
27	28	435	16.02	4.4	20.42
28	29	604	19.21	4.4	23.61
29	30	744	30.99	4.4	35.39
30	31	707	29.38	4.4	33.78
31	32	614	19.53	4.4	23.93
32	33	613	19.29	4.4	23.69
33	34	735	30.21	4.4	34.61
34	35	748	30.83	4.4	35.23
35	36	763	31.46	4.4	35.86
36	37	699	28.74	4.4	33.14
37	38	732	30.05	4.4	34.45
START Str #	END Str #	Span (ft)	Max Blowout Offset from Centerline (90 mph)	Minimum Vegetation Clearance Distance (ft) per NERC FAC-003	TOTAL (ft)
38	39	750	30.93	4.4	35.33
39	40	751	30.97	4.4	35.37
40	41	619	19.54	4.4	23.94
41	42	555	18.06	4.4	22.46
42	43	654	27.82	4.4	32.22
43	44	661	28.05	4.4	32.45
44	45	567	18.45	4.4	22.85
45	46	619	19.42	4.4	23.82

46	47	771	31.63	4.4	36.03
47	48	778	31.98	4.4	36.38
48	49	764	31.41	4.4	35.81
49	50	753	30.88	4.4	35.28
50	51	752	30.8	4.4	35.2
51	52	762	31.35	4.4	35.75
52	53	770	39.95	4.4	44.35
53	54	360	34.91	4.4	39.31
54	55	712	38	4.4	42.4
55	56	710	29.54	4.4	33.94
56	57	705	29.23	4.4	33.63
57	58	702	29.09	4.4	33.49
START Str #	END Str #	Span (ft)	Max Blowout Offset from Centerline (90 mph)	Minimum Vegetation Clearance Distance (ft) per NERC FAC-003	TOTAL (ft)
58	59	702	29.07	4.4	33.47
59	60	695	28.77	4.4	33.17
60	61	683	28.31	4.4	32.71
61	62	714	29.57	4.4	33.97
62	63	781	32.44	4.4	36.84
63	64	637	22.11	4.4	26.51
64	65	516	17.57	4.4	21.97
65	66	663	21.9	4.4	26.3
66	POI	505	33.48	4.4	37.88

Appendix V

Annual Test Calls to Operation Centers - FAC-003-5 Compliance

Objective: The purpose of this policy is to establish a standardized procedure for making test calls to operation centers, specifically simulating vegetation conditions that are likely to cause a fault at any moment. This procedure ensures compliance with FAC-003-5 standards and helps verify the effectiveness of communication protocols during potential vegetation-related emergencies.

Scope: This policy applies to all personnel responsible for conducting test calls to operation centers within the utility.

Procedure:

1. **Identification of Test Scenario:**
    - A vegetation condition that is likely to cause a fault imminently has been discovered during routine inspection.
2. **Notification to Operation Centers:**
    - Notify the relevant operation centers in advance of the test call, ensuring that key personnel are aware of the upcoming simulation. Clearly communicate that the call is a test and provide details of the simulated vegetation condition. Once the Operations Center is ready to record, initiate the simulated call
3. **Simulated Call Initiation:**

- Initiate the simulated call to the operation center using a predefined script that accurately represents the identified vegetation condition. The script should include details such as location, type of vegetation, and observed risk factors. The operation center should then simulate notifying the holding authority and communicate that the line is de-energized and ready to be worked. After confirming the de-energization, the caller shall confirm the de-energization and then inform the operating center the condition has been cleared, crews are down and clear of the line and the line is ready to be energized. The operation center shall then simulate notifying the holding authority that the line is clear and ready for energization and inform the caller of that the line has been energized.

4. Documentation of Test Call:
    - Upon completion of the call the recording shall be downloaded and sent to the Manager of Vegetation and Manager of NERC compliance. Maintain records for compliance reporting and analysis.
5. Regular Testing Schedule:
    - Establish an annual schedule for conducting test calls to operation centers, ensuring that a variety of vegetation conditions are simulated over time. This helps maintain readiness and assesses the utility's overall preparedness.
6. Compliance Reporting:
    - Include the results of test calls in compliance reports as required by FAC-003-5 standards.

Review and Approval: This policy and procedure will be periodically reviewed and updated as needed to ensure ongoing compliance with FAC-003-5 standards.

Title: NERC Transmission Vegetation Management Program	Revision: J	Author: Jason Grossman 4/1/24

Approval Signatures and date:

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Applicable NERC Standard(s): FAC-003-5

Version History

Version No.	Revision Date	Revised By	Description of Revisions
I	12/06/22	Larin McCulley	Updated Doc format and made document agnostic with the additional of Neosho Ridge
J	4/1/24	Jason Grossman	Update to FAC-003-5. Added Appendix IV Sag and Sway for Neosho Ridge. Added Appendix V for Test Calls