Transmission Vegetation Management Overview

Progress Energy Carolinas employs an Integrated Vegetation Management Program (IVMP) to maintain vegetation along its transmission system rights of way. The use of proactive vegetation management methods reduces the need to employ reactive reliability-based trimming/removal and danger tree cutting. Vegetation management methods may include, but are not limited to, tree removals, mechanical mowing, herbicide control and mechanical or manual side-trimming.

Program Objectives

Progress Energy’s integrated vegetation management plan ensures the safe and reliable operation of the transmission system by minimizing vegetation related interruptions and ensuring adequate conductor-to-vegetation clearances, while maintaining compliance with regulatory, environmental and safety requirements/standards. The program activities focuses on the removal and/or control of incompatible vegetation within the right-of-way to minimize the risk of vegetation-related outages.

Right-of-Way Use: Management of Tree Plantings Within the Right-of-Way

Progress Energy Carolinas utilizes easements, permits, franchise agreements and/or company-owned lands for the rights of way on which its transmission lines are constructed. These agreements govern Progress Energy Carolinas’ rights, which include the right to clear and keep clear vegetation in the right of way.

Any existing tree that can mature at a height greater than 12 feet or potentially interfere with the safe and reliable operation of the line will be evaluated for removal. Progress Energy Carolinas does not object to property owners planting trees or other vegetation on transmission easements, provided it matures at a height of 12 feet or shorter, does not interfere with Progress Energy’s access and/or maintenance requirements and is not directly under the conductor.

Easement Rights

The rights conveyed with the agreements listed above represent legal, binding agreements between Progress Energy Carolinas and the property owners, many
of whom are not direct customers of Progress Energy Carolinas. The legal rights were purchased for the construction, maintenance and safe/reliable operation of transmission lines to provide service for all Progress Energy Carolinas customers, and they grant specific rights to the easement holder.

**Right-of-Way Planting Restrictions**

The rights conveyed with the agreements listed above, many of which specifically exclude planting vegetation that matures at heights greater than 12 ft., provide the easement holder (Progress Energy Carolinas) with the right to clear and keep clear the right-of-way corridor.

Progress Energy Carolinas’ Transmission Line Right-of-way Use Guidelines specifically state that any planting of vegetation within existing rights-of-way “must not exceed a maximum height of 12 feet at maturity, and may not interfere with Progress Energy’s access and/or maintenance requirements”:

- Leaving vegetation that matures at heights above 12 ft. requires, in most cases, an engineering and/or arboricultural evaluation that may also include site-specific survey accuracy measurements.
- With over 60,000 property owners along the 6,000 miles of transmission rights-of-way in the Carolinas, exceptions beyond those included in legal documents cannot be managed without affecting the safe and reliable operation of the transmission system.
- Rights granted in legal documents define any exceptions to the 12 ft. planting restriction (i.e., written approval).
- The legal rights to maintain the right-of-way were purchased by Progress Energy Carolinas for transmitting energy safely and reliably to all customers.

**Right-of-Way Maintenance: Vegetation Management**

In order to ensure safe and reliable operation of its transmission lines, Progress Energy Carolinas uses a “conductor-down” or “side-swing” approach to determine the appropriate integrated vegetation management methods that are to be implemented.

**Controlling Large Areas of Trees/Vegetation**

With 60-70 percent of transmission right-of-way corridors in forested areas (typical in the southeast), herbicide control or mechanical mowing may be used to control large areas of vegetation within the right-of-way. Herbicide control is the preferred method of control and is used to reduce the stem count and root systems within the right-of-way, allowing typical three-year cycles to ensure
reliability. Mechanical mowing is used when necessary or appropriate but does not always ensure safety and reliability. Mowing increases the number of stems within the right-of-way over time and leads to large root structures which result in significant vegetation growth rate increases, leading to reliability risks.

**Trees/Vegetation That Could Grow Into the Conductor**

Trees that mature at heights above 12 feet within the right-of-way have the potential to create outages and will be evaluated for removal based on numerous criteria (see below). Considering the applicable evaluation criteria for site-specific circumstances, the Progress Energy Carolinas forester/arborist will determine if the tree/vegetation at the expected mature height has the potential to grow within 10 feet (or 20 feet on 500-kV lines) of the maximum sag point of the conductor and then remove that vegetation.

**Trees/Vegetation That Could Fall Into Conductor**

For trees within the right-of-way that can fall into the line, the threat to reliability exists and is considered controllable. At some voltages, the regulatory requirements associated with these types of outages can be described as a “zero tolerance”. Vegetation within the right-of-way that can fall into the conductor will be removed.
Vegetation Management Due to Conductor Side-swing

In addition to removal of vegetation within the right-of-way that can grow or fall into the conductor, trees/vegetation along the edge and outside of the right-of-way will be evaluated for removal or side-trimming.

Evaluation Criteria for Vegetation Removal/Management Activity

Many factors and criteria have to be considered when evaluating the need to remove vegetation and the appropriate method of vegetation control. Those factors fall into three categories (Engineering & Design, Arboricultural and Regulatory) and require an experienced utility vegetation management professional to complete the evaluation.
**Engineering & Design Evaluation/Criteria**

The following represent some of the criteria related to engineering and design that are included in any detailed evaluation for tree removal:

- **Conductor Sag at Rated Maximum Operating Conditions:** The conductor sag in a typical span at the rated maximum operating conditions will vary significantly, sagging 10-15 ft below the levels seen on a normal operating day, with some spans sagging much more than 15 ft below their normal level. The sag will vary from span to span based on conductor size, tension in the wire, ambient temperatures and numerous other criteria. The conductor sag, combined with the mature height of the tree, may result in inadequate clearance as mentioned previously in this document.

- **Progress Energy Design Criteria:** Conductor height is a company-defined engineering standard minimum distance (at the time of design) under maximum planned operating conditions and is a factor of structure heights, span length, topography, buffers to address variations in available information and the operating characteristics of the line within a span.

- **National Electric Safety Code Criteria:** In general, minimum design standards for conductor heights incorporate the distances required under the applicable version National Electric Standards Code (NESC) at the time of line design.

- **Ground Topography:** As elevation changes, the distance between conductors and ground changes. Clearances must consider the impact that topographical changes will have on the distances to the conductors (from ground or from vegetation).

- **Site-specific Information:** Site-specific information such as wind loading zones, altitude, etc., also influence transmission facility characteristics.

**Arboricultural Evaluation/Criteria**

The following are representative of arboriculture criteria that may be included in any detailed evaluation for tree removal:

- **Vegetation Heights at Maturity:** Arboricultural understanding of the species (and species cultivar) is required to determine the average
mature height of vegetation. Progress Energy Carolinas must rely on the average, estimated or predicted vegetation heights at maturity for specific cultivars in a basis document, which for Progress Energy Carolinas is the “Manual of Woody Landscape Plants” by Michael Dirr.

- **Vegetation Growth Rates**: Arboricultural understanding of the factors involved in determining the growth rates of vegetation species must be combined with local environmental conditions as well as land uses and topography. These factors include but are not limited to: soil conditions, plant characteristics, plant condition, plant shape (upright vs. spread, etc), sources of water, local plant competition, etc.

- **Vegetation Condition**: Stressed, damaged, healthy, etc.

- **Vegetation Shape**: Upright vs. spreading vs. compact, etc.

- **Local Environmental Conditions**: Availability of water, nutrients, etc.

**Regulatory & Safety Evaluation/Criteria**

- **NERC VM Standard (FAC-003)**: The NERC VM Standard has a zero tolerance for vegetation on or off the right-of-way growing into the conductor under rated electrical operating conditions. The standard also has a zero tolerance for vegetation on the right-of-way falling into the conductor at any time.

- **Utility-defined Minimum Conductor to Vegetation Clearances**: The NERC VM Standard requires utilities to define minimum conductor-to-vegetation clearance that cannot be encroached upon under all rated electrical operating conditions. These minimum clearances vary by voltage.

- **Minimum Safe Worker Approach Distances**: Specific safety code clearances related to transmission voltages must be maintained. These safe working distances are included in tree removal evaluation.

- **Land Use**: Land use can affect the ability to manage vegetation to stated clearances under certain use activities.

**Responsibility for Maintaining Vegetation**
Progress Energy Carolinas does not allow individual property owners to maintain vegetation to ensure reliable operation of the transmission line facilities. For vegetation that is close to the transmission lines and/or poses a threat to reliability, qualified tree clearance contractors will be used for that work under the direction of Progress Energy Carolinas. Progress Energy Carolinas:

- Cannot delegate the responsibility for vegetation management that ensures safe and reliable operation of the transmission system.
- Cannot provide oversight to potentially tens of thousands of individual property owners, managing potentially hundreds of thousands of trees.
- Uses vegetation contractors that are trained and equipped to work near transmission facilities.

Progress Energy Carolinas does not manage any vegetation that may remain in the right-of-way for landscaping, aesthetic, security, agricultural or other requirements.

**Consistency**

Progress Energy Carolinas strives to consistently apply the vegetation management program among all property owners in the Carolinas. To do this, the legal contracts between the property owners and Progress Energy Carolinas govern the rights to control vegetation in the right-of-way corridor.

**Property Owner Contact/Communication**

In residential, commercial and maintained areas, Progress Energy customers are typically notified with a minimum of two days notice, prior to vegetation maintenance work commencing.

Notification methods vary depending on the type and voltage of the line. Notification is typically made by door hanger, but may also include a telephone call, letter, in-person contact or a combination of these methods. A point of contact will also be provided should you have questions or concerns about the work being done. If our attempts to notify you are unsuccessful, work will proceed without further direction notification.

Although a minimum of two days notice is typical, there are exceptions: a tree may be cut sooner with customer acknowledgement or if it is a danger tree. Danger trees include those that are dead, diseased or damaged, and/or pose a threat to the safe and reliable operation of the line.

For the remaining activities in the program – many of which strictly involve traversing the right-of-way corridor, courtesy contacts generally occur when accessing the right-of-way or when other potential impact beyond normal cyclical maintenance is expected.