Development and Services Committee

Norman Jackson	Damon Jeter	Julie-Ann Dixon (Chair)	Bill Malinowski	Seth Rose
District 11	District 3	District 9	District 1	District 5

December 15, 2015 - 5:00 PM
2020 Hampton St.

Call to Order

Approval of Minutes

1 Regular Session: November 24, 2015 [PAGES 4-8]

Adoption of Agenda

Items for Action

2 Fund and/or seek a partnership with SCE&G to plant indigenous flowers and plants along transmission line corridors in Richland County [PAGES 9-13]

3 Resolution encouraging all utility companies that own and/or operate transmission line right of ways in Richland County to adopt Integrated Vegetation Management (IVM) techniques as set out by ANSI standard A300 [PAGES 14-43]

Items Pending Analysis: No Action Required

4 Motion to Explore all Options for Providing County Assistance with a Public Housing Project [PAGE 44]

5 Comprehensive Youth Program [PAGE 45]

6 Request for Easement – Hiller Road [PAGE 46]

Adjournment

Special Accommodations and Interpreter Services Citizens may be present during any of the County's meetings. If requested, the agenda and backup materials will be made available in alternative formats to persons with a disability, as required by Section 202 of the Americans with Disabilities Act of 1990 (42 U.S.C. Sec. 12132), as amended and the federal rules and regulations adopted in implementation thereof. Any person who requires a disability-related modification or accommodation, including auxiliary aids or services, in order to participate in the public meeting may request such modification, accommodation, aid or service by contacting the Clerk of Council's office either in person at 2020 Hampton Street, Columbia, SC, by telephone at (803) 576-2061, or TDD at 803-576-2045 no later than 24 hours prior to the scheduled meeting.

DEVELOPMENT & SERVICES COMMITTEE

November 24, 2015
5:00 PM
County Council Chambers

In accordance with the Freedom of Information Act, a copy of the agenda was sent to radio and TV stations, newspapers, persons requesting notification, and was posted on the bulletin board located in the lobby of the County Administration Building

CALL TO ORDER

Ms. Dixon called the meeting to order at approximately 5:00 PM

APPROVAL OF MINUTES

Regular Session: October 27, 2015 – Mr. Jackson moved, seconded by Mr. Malinowski, to approve the minutes as distributed. The vote in favor was unanimous.

ADOPTION OF AGENDA

Mr. Malinowski moved, seconded by Mr. Jackson, to adopt the agenda as published. The vote in favor was unanimous.

ITEMS FOR ACTION

Fund and/or seek a partnership with SCE&G to plan indigenous flowers and plants along transmission line corridors in Richland County – Mr. Jackson moved, seconded by Mr. Malinowski, to defer this item until the December 15th Committee meeting. The vote in favor was unanimous.

Resolution encouraging all utility companies that own and/or operate transmission line right of ways in Richland County to adopt Integrated Vegetation Management (IVM) techniques as set out by ANSI standard A300 – Mr. Jackson moved, seconded by Mr. Malinowski, to defer this item until the December 15th Committee meeting. The vote in favor was unanimous.

Removal of Lien off Property – Mr. McDonald stated this item was before the committee at the October Committee meeting. The committee inquired if the nonprofit that own the property were public or private. It was determined they are a public nonprofit organization. The intended use of the property is passive recreational or open space recreation.

Mr. Malinowski inquired about the length of time the organization has owned the property at 2045 Smith Street.

Council Members Present

Julie-Ann Dixon, Chair
District Nine

Bill Malinowski
District One

Damon Jeter
District Three

Norman Jackson
District Eleven

Others Present:

Kelvin E. Washington, Sr.
Torrey Rush
Paul Livingston
Tony McDonald
Sparty Hammett
Warren Harley
Brandon Madden
Michelle Onley
Larry Smith
Roxanne Ancheta
Daniel Driggers
Monique McDaniels
Kim Roberts
Kecia Lara
Rob Perry
John Hixon
Janet Claggett
Synithia Williams
Rudy Curtis
Tracy Hegler
Pam Davis
Nancy Stone-Collum
Quinton Epps
Chad Fosnight

Mr. McDonald stated he did not know the answer to Mr. Malinowski's question, but would provide him an answer prior to the item being voted on by full council.

Mr. Malinowski inquired if there is presently a building on the property.

Ms. Lara stated the building on the property was demolished by the County.

Mr. Malinowski stated he will vote against removing the lien because of the comments by Finance, "…recommend that the County recover the funds either from the owner or through the property closing costs as the property is transferred." In addition, Legal stated, "…there is no reason stated as to why the organization cannot use the property as it exist right now, as long as you want to. The only time the County could collect the money is if the organization ever tried to sell the land."

Mr. Jackson moved, seconded by Ms. Dixon, to forward this item to Council with a recommendation to have Richland County remove the lien off of the property located at 1420 Joe Frazier Court (Parcel # #R13516-03-03).

Mr. Washington inquired if the contiguous property at 2045 Smith Street had a lien on it and Council voted to remove that lien.

Ms. Lara replied in the affirmative.

Mr. Malinowski made a substitute motion, seconded by Mr. Jeter, to forward this item to Council without a recommendation.

FOR	**AGAINST**
Dixon	Jackson
Malinowski	
Jeter	

The vote was in favor of forwarding this item to Council without a recommendation.

Council member Jackson's Motion Regarding Unauthorized Businesses – Mr. Jackson stated there have been several complaints about businesses operating without business and alcohol licenses. There are also businesses that are licensed for one type of business and operate as something different. He is requesting staff to inform him what needs to be done to fine or shut down the businesses operating illegally.

Mr. McDonald stated staff agrees that businesses operating without business license or under the guise of another type of business are a problem. As the County goes forward to formulate a plan to address the issue more aggressively to continue to receive input from Legal regarding enforcement actions.

Mr. Smith stated the ordinance contains certain enforcement mechanisms short of closing a business that can utilized if a business is operating without a license.

Mr. Jackson stated he does not want to see vehicles with flashing light going to businesses to conduct inspections. The City of Columbia conducts their inspections by parking a block down from the business, quietly walk in and conduct their inspection.

Mr. Malinowski inquired of Mr. Jackson if any businesses have been reported to the Business Service Center because they were in violation of the County's ordinances.

Mr. Jackson stated the people he spoke were encouraged to report the businesses. Those persons stated they had contacted the Ombudsman's Office to file a complaint.

Mr. Malinowski inquired if there are currently any businesses that are in violation of business licensing regulations.

Mr. McDonald stated there are businesses the County has identified through enforcement and the audit process that are operating without licenses. Of course, when those situations are found the owner of the business is notified through a process through the Business Service Center in an attempt to bring the business into compliance. The County can charge penalties and late fees, but it is presently questionable if the County can physically close a business if they do not have a business license.

Mr. Malinowski stated he feels Legal needs to begin reviewing the County's current ordinance and not wait until the Council Retreat to move forward.

Mr. Malinowski moved, seconded by Mr. Jackson, to forward to Council with a recommendation to direct staff to objectively review and pursue the closure of all businesses operating in Richland County without the appropriate business licenses.

Mr. Jackson inquired how many sexually oriented businesses licenses has the County issued.

Mr. McDonald stated he is not sure the County has a sexually oriented business license.

Mr. Jackson stated in a State Newspaper article it was reported there were over 28 sexually oriented businesses operating in Richland County. None of these businesses have business licenses and they do not pay taxes.

The vote in favor was unanimous.

Conservation Department – Hopkins Conservation Easement on Lower Richland Blvd. – Mr. Malinowski moved, seconded by Mr. Jackson, to forward to Council with a recommendation to approve the request to place a conservation easement on 60 acres thus preserving the land in perpetuity for agricultural production, forestland, and wildlife habitat. The vote in favor was unanimous.

Solid Waste – Award of Contract for a Comprehensive Audit and RFID RetroFit of All County Garbage and Recycling Roll Carts – Mr. McDonald stated the intent of this item is to take an audit of the roll carts the County has out in the neighborhoods. The number of roll carts and their location determines the amount paid to the collectors. In addition, Solid Waste has begun instituting an electronic monitoring mechanism on the roll carts to assist with locating stolen roll carts.

Mr. Harley stated the electronic monitoring will be able to give Solid Waste the GPS coordinate of where the roll carts are located, as well as, a more accurate count of carts on the ground. It will also be able to detect when the collectors "tip" the roll carts.

The costs for the audit and retrofit of the roll carts will be less than $300,000.

Mr. Washington inquired about the cost of each roll cart.

Mr. Harley responded each roll cart is approximately $50.00.

Mr. Washington then inquired if the chips are being attached or if new carts are being obtained with the chips already installed.

Mr. Harley responded the roll carts without chips installed will have chips installed in them. The new roll carts will have the chips already installed.

Mr. Washington inquired the price of the chips.

Mr. Harley responded each chip is approximately $0.50.

Mr. Washington inquired if the serial number on the roll carts is used to track the roll carts presently.

Mr. Curtis stated the serial number on the carts is kept in a database, but there is no electronic way to track the carts.

Mr. Malinowski inquired about the number of roll carts reported stolen each year.

Mr. Curtis stated approximately 200 are stolen.

The significance of the audit is to determine the number of roll carts out. An audit has not been done in 20 years; therefore, there is not an accurate number to base the collector's fees on.

Ms. Dixon inquired about what areas have already been retrofit and/or chipped.

Mr. Curtis stated Areas 7 and 5b have been audited and retrofitted.

Mr. Washington inquired if all of the roll carts have been replaced from the flooding event.

Mr. Curtis responded all of the ones they know about have been replaced.

Mr. Jackson moved, seconded by Mr. Jeter, to forward to Council with a recommendation to approve the award of the contract to BMT Services. The vote in favor was unanimous.

Request for Easement – Hiller Road – Mr. Jackson moved, seconded by Mr. Malinowski, to defer this item until the December Committee meeting. The vote in favor was unanimous.

ITEMS PENDING ANALYSIS

Motion to Explore all Options for Providing County Assistance with a Public Housing Project – This item was held in committee.

Comprehensive Youth Program – This item was held in committee.

ADJOURNMENT

The meeting adjourned at approximately 5:39 PM.

The Minutes were transcribed by Michelle M. Onley, Deputy Clerk of Council

Richland County Council Request of Action

Subject:

Fund and/or seek a partnership with SCE&G to plant indigenous flowers and plants along transmission line corridors in Richland County

Richland County Council Request of Action

Subject: Fund and/or seek a partnership with SCE&G to plant indigenous flowers and plants along transmission line corridors in Richland County

A. Purpose

County Council is requested to direct staff to move to fund and/or seek a partnership with SCE&G (South Carolina Energy and Gas) to plant indigenous flowers and plants along transmission line corridors in Richland County.

B. Background / Discussion

On February 10, 2015, Council member Rose brought forth the following motion:

> "Move to fund and/or seek a partnership with SCEG to plant indigenous flowers and plants along transmission line corridors in Richland County"

Transmission lines are high capacity power lines that bring electricity from generating stations out into communities in the county. Transmission line corridors are the areas along a transmission line right of way, which is the strip of land purchased by an energy company (SCE&G) from an individual property owner for the company to install the lines and related equipment – see attached illustration.

In some instances, the strip of land along the transmission line corridors can provide an environment that is conducive to native plant and animal life that require the type of habitat maintained beneath the transmission lines.

As such, this request to Council is to direct staff to fund and/or seek a partnership with SCE&G to plant indigenous flowers and plants to the Midlands along the transmission line corridors. This could serve as an effort to beautify the strips of land in and around the corridors of the transmission lines.

C. Legislative / Chronological History

Motion by Mr. Rose – February 10, 2015

D. Financial Impact

The financial impact to the County regarding this motion is unknown at this time. The cost to direct staff to explore a partnership with SCE&G is negligible.

To estimate the cost of planting the flowers and plants along the corridors will require staff to research the types of indigenous plants and flowers that can survive along the corridors, along with any costs associated with planting and maintaining the flowers. Also, there may be a cost associated with obtaining the necessary easements along the corridors to plant the flowers if staff is unable to develop a partnership with SCE&G regarding this request.

If approved, staff can research the aforementioned information and bring it back to Council for their consideration. Staff will need direction regarding the funding source for any of the costs associated with this request.

E. Alternatives

1. Approve the request to direct staff to move to fund and/or seek a partnership with SCE&G (South Carolina Energy and Gas) to plant indigenous flowers and plants along transmission line corridors in Richland County.

2. Do not approve the request to direct staff to move to fund and/or seek a partnership with SCE&G (South Carolina Energy and Gas) to plant indigenous flowers and plants along transmission line corridors in Richland County.

F. Recommendation

This recommendation was made by Mr. Rose. This is a policy decision for Council.

Recommended by: Seth Rose
Department: County Council
Date: 2/10/15

G. Reviews

Finance

Reviewed by: Daniel Driggers — Date: 2/17/15

❑ Recommend Council approval — x Recommend Council denial

Comments regarding recommendation:

This is a request for Council discretion. Recommendation is based on the request being out of the budget funding cycle and not the merits of the program. It may be appropriate for the request to be considered during the FY16 budget process. Approval would require the identification of a funding source.

Support Services:

Reviewed by: John Hixon — Date: 2/19/15

❑ Recommend Council approval — ☑ Recommend Council denial

Comments regarding recommendation:

Although this is Council discretion, I recommend denial based on the alternatives to fund or seek partnership with SCE&G until the corridors for improvement are specified, allowing the generation of a scope of work and subsequent resource requirements. SCE&G currently maintains over 3,500 miles of transmission line that ranges from 50 feet to 500 feet in width.

Although I believe the intent to use indigenous plants is to minimize required maintenance, we would be responsible for protecting the investment and aesthetics of the sites and any additional workload, especially during the growing season, will create a major concern with our ability to properly maintain our current assets. Our facilities division currently has six employees maintaining approximately 350 acres of county owned grounds and we are requesting additional resources in the FY16 budget to maintain the new property's being brought into the county. I should also note that we do not have the specialized equipment needed to supply water to sites that are not irrigated so a program such as this may require a capital investment as well.

Perhaps a program such as the DOT uses for the wildflower patches along the interstate system could be more manageable once the breadth of the program is clearly identified, although the preparing of the planting areas each year will require substantial work prior to seeding.

Public Works:

Reviewed by: Ismail Ozbek Date: 2/19/15

❑ Recommend Council approval ✓ Recommend Council denial

Comments regarding recommendation:

Recommend denial due to funding not being identified and scope not being defined. Staff can still be directed to explore parnerships.

Legal

Reviewed by: Elizabeth McLean Date: 2/19/15

❑ Recommend Council approval ❑ Recommend Council denial

Comments regarding recommendation: Policy decision left to Council's discretion. I would note that the ROA requests either funding or having staff explore a partnership with SCE&G. I am unaware how the County would proceed without securing permission from SCE&G, as SCE&G would be the easement holder and not the County. Thus, the County would have no legal right to enter any power line easement area to plant without SCE&G's permission.

Administration

Reviewed by: Roxanne Ancheta Date: February 19, 2015

X Recommend Council approval ❑ Recommend Council denial

Comments regarding recommendation: It is recommended that Council direct staff to gather more information on a potential partnership with SCE&G (South Carolina Energy and Gas) to plant indigenous flowers and plants along transmission line corridors in Richland County. Once this information is obtained, including any budgetary impact on the County, the item will be brought back to Council for review and action.

Richland County Council Request of Action

Subject:

Resolution encouraging all utility companies that own and/or operate transmission line right of ways in Richland County to adopt Integrated Vegetation Management (IVM) techniques as set out by ANSI standard A300

Richland County Council Request of Action

Subject: Resolution encouraging all utility companies that own and/or operate transmission line right of ways in Richland County to adopt Integrated Vegetation Management (IVM) techniques as set out by ANSI standard A300

A. Purpose

County Council is requested to consider Mr. Rose's motion to enact a Resolution encouraging all utility companies that own and/or operate transmission line right of ways in Richland County to adopt Integrated Vegetation Management (IVM) techniques as set out by ANSI standard A300.

B. Background / Discussion

At the October 20, 2015 County Council meeting, Mr. Rose brought forth the following motion:

> "Move to enact a resolution encouraging all utility companies that own and/or operate transmission line right of ways in Richland County to adopt Integrated Vegetation Management (IVM) techniques as set out by ANSI standard A300. Rationale: Per the Environmental Protection Agency, "IVM is generally defined as the practice of promoting desirable, stable, low-growing plant communities-that will resist invasion by tall-growing tree species-through the use of appropriate, environmentally sound, and cost-effective control methods." An added benefit to this technique is that it offers a protective environment for wildlife to flourish. The American National Standards Institute has been in existence since 1918. Its primary goal is the "enhancement of global competitiveness of U.S. business and the American quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems and promoting their integrity." While utilities in Richland County appear to maintain their transmission right of ways using some of the techniques set forth under the ANSI standard, none of them use them all, and none of them fully follow the standard. Standards are there for a reason: because they are best practices. Richland County has hundreds of square miles of transmission right of way, and it needs to be utilized to its full capacity to promote the health of our citizens and our wildlife habitat."

The American National Standards Institute (ANSI) oversees the creation, promulgation and use of norms and guidelines that directly impact businesses in different sectors: from acoustical devices to construction equipment, from dairy and livestock production to energy distribution and the tree care industry.

ANSI A300 provides unified standards for the tree care industry. The A300 standards are divided into multiple parts, each focusing on a specific aspect of woody plant management (e.g. Pruning, IVM, etc) and are used to develop written specifications for work assignments. The standards apply to professionals who provide for or supervise the management of trees, shrubs, and other woody landscape plants, such as property managers and utility companies.

Part 7 of the ANSI A300 applies to IVM for utility rights-of-way (ROW), and provides general standards for professionals in the tree care industry as it pertains to site evaluations, vegetation control methods, herbicide application processes, etc.

At this time staff, staff is requesting Council consideration of Mr. Rose's motion.

Part 7 of the ANSI A300 is attached, along with a draft Resolution, to this request of action.

C. Legislative / Chronological History

There is no legislative history associated with this request.

D. Financial Impact

There is no financial impact associated with this request

E. Alternatives

1. Consider Mr. Rose's motion and unanimously approve the Resolution.

2. Consider Mr. Rose's motion and do not unanimously approve the Resolution.

F. Recommendation

I recommend unanimous approval of the Resolution.

Recommended by: Seth Rose
Department: County Council
Date: October 20, 2015

G. Reviews

(Please replace the appropriate box with a ✓ and then support your recommendation in the Comments section before routing on. Thank you!)

Please be specific in your recommendation. While "Council Discretion" may be appropriate at times, it is recommended that Staff provide Council with a professional recommendation of approval or denial, and justification for that recommendation, as often as possible.

Finance

Reviewed by: Daniel Driggers Date: 11/3/15
❑ Recommend Council approval ❑ Recommend Council denial
✓ Recommend Council discretion
Comments regarding recommendation:

Request is a policy decision for Council's discretion with no financial impact.

Legal

Reviewed by: Elizabeth McLean Date: 11/4/15
❑ Recommend Council approval ❑ Recommend Council denial
Comments regarding recommendation: Policy decision left to Council's discretion.

Administration

Reviewed by: Sparty Hammett Date: 11/4/15
❑ Recommend Council approval ❑ Recommend Council denial
Comments regarding recommendation: Council discretion.

STATE OF SOUTH CAROLINA)
) **A RESOLUTION**
COUNTY OF RICHLAND)

A RESOLUTION ENCOURAGING ALL UTILITY COMPANIES THAT OWN AND/OR OPERATE TRANSMISSION LINE RIGHT OF WAYS IN RICHLAND COUNTY TO ADOPT INTEGRATED VEGETATION MANAGEMENT (IVM) TECHNIQUES AS SET OUT BY ANSI STANDARD A300

WHEREAS, the mission of the American National Standards Institute (ANSI) is to enhance global competitiveness of U.S. business and the American quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems and promoting their integrity; and

WHEREAS, Integrated Vegetation Management is generally defined as the practice of promoting desirable, stable, low-growing plant communities-that will resist invasion by tall-growing tree species-through the use of appropriate, environmentally sound, and cost-effective control methods; and

WHEREAS, the ANSI standard A300 sets out Integrated Vegetation Management techniques for Utility Rights-of-Ways that are considered best practices; and

WHEREAS, Richland County has hundreds of square miles of transmission Right-of-Ways that are maintained by private utility companies; and

NOW, THERFORE, BE IT RESOLVED by the Richland County Council that Richland County encourages all utility companies that own and/or operate transmission line Right-of-Ways in Richland County to adopt Integrated Vegetation Management (IVM) techniques as set out by ANSI standard A300.

SIGNED AND SEALED this ___ day of _____ 2015, having been duly adopted by the Richland County Council.

_____
Torrey Rush, Richland County Council

ATTEST this ___ day of _____ 2015

_____
Monique S. McDaniels, Clerk of Council

Best Management Practices

INTEGRATED VEGETATION MANAGEMENT FOR UTILITY RIGHTS-OF-WAY

Second Edition 2014

Randall H. Miller

ISBN: 978-1-881956-81-5

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Production Coordinator: Amy Theobald
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Illustrations by Bryan Kotwica
Printed by: Martin One Source, Champaign, Illinois, USA
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Purpose

The International Society of Arboriculture (ISA) has developed a series of Best Management Practices (BMPs) for the purpose of interpreting tree care standards and providing guidelines of practice for arborists, tree workers, and the people who employ their services.

Because trees and other plants are unique living organisms, and they—as well as the ecosystems in which they live—are variable by nature, not all practices can be successfully applied in all cases. A qualified arborist or utility vegetation manager should write or review contracts and specifications using national standards and this BMP. Departures from the standards should be made with careful consideration of the objectives and with supporting rationale.

This BMP is for the selection and application of methods and techniques for vegetation control for electric rights-of-way projects and gas pipeline rights-of-way. It also serves as a companion publication for the integrated vegetation management portion of the *American National Standard for Tree Care Operations—Tree, Shrub, and Other Woody Plant Management—Standard Practices* (*Integrated Vegetation Management a. Utility Rights-of-Way*) (ANSI A300, Part 7).

Acknowledgments

The Integrated Vegetation Management Best Management Practices Review Committee (Second Edition)

Paul Appelt, Environmental Consultants, Stoughton, Wisconsin, USA
Jennifer Arkett, Duquesne Light Co., Pittsburgh, Pennsylvania, USA
Richard Johnstone, Integrated Vegetation Management Partners, Inc., Newark, Delaware, USA
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Introduction

Unmanaged vegetation growing near utility rights-of-way can damage utility facilities and cause problems with safety, reliability, access, emergency service restoration, regulatory compliance, security, and lines-of-sight. It can also compromise compliance with environmental, legal, regulatory, and other requirements.

Vegetation interference with power lines is one of the most common causes of electrical outages on distribution systems, and has initiated transmission grid failures that have subjected millions of people to lengthy blackouts. Vegetation can cause electric service interruptions when it contacts overhead high voltage conductors or comes sufficiently close to create a spark-over. Vegetation and conductors can come too close together when they are blown into one another by high winds, or when lines stretch and sag due to high temperatures, heavy snow, or ice buildup (Figure 1). During dry conditions, vegetation sparking-over with power lines can start wildfires. Trees may also provide access for children, workers, and others to high voltage lines overhead, potentially resulting in direct or indirect contact that can cause serious injury or death.

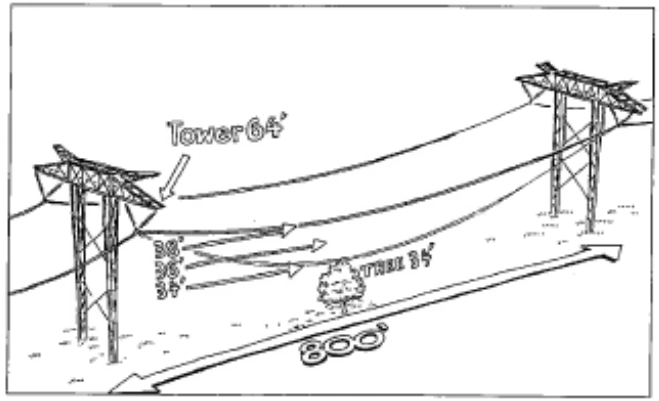

Figure 1. Line sag.

Vegetation can interfere with access to, and maintenance of, pipelines. For example, underground pipelines can be obstructed by vegetation, making it impossible to detect leaks from the ground or air.

Utilities must comply with federal, state or provincial, and local regulations that require vegetation control in proximity to electric and gas facilities. For example, in the United States, the North American Electric Reliability

Corporation (NERC) *Transmission Vegetation Management Program* standard contains clearance requirements for critical transmission lines. Moreover, the Energy Policy Act of 2005[1] contains provisions for electric system reliability standards, including those for vegetation management. Based on this provision, the Federal Energy Regulatory Commission has adopted the NERC *Transmission Vegetation Management Program* standard (NERC 2008), which essentially gives the NERC standard the force of law. Another important regulation is the National Electrical Safety Code (NESC [IEEE 2012]), section 218, of which requires utilities to prune or remove trees that may damage ungrounded supply conductors.

Many utilities manage millions of trees across thousands of miles (kilometers) of line. That means in every mile (1.6 km) of line, a utility can potentially have hundreds of trees, any one of which could compromise public safety and electrical service reliability. It is impossible to completely secure an electrical system from that level of exposure. Nevertheless, vegetation managers have a responsibility to make a reasonable effort to maintain vegetation to reduce risks to both the public and utilities. The integrated vegetation management (IVM) best management practices outlined in this publication are tools for use toward that objective.

The intent of this publication is to serve as a companion to ANSI A300 Part 7: *Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Integrated Vegetation Management a. Electric Utility Rights-of-Way)* (ANSI 2012). It is designed to provide practitioners with what industry experts consider to be the most appropriate integrated vegetation management (IVM) techniques to apply to utility right-of-way projects. Integrated vegetation management best practices can also be used to fulfill other objectives, such as vegetation control on gas pipeline rights-of-way, and activities outside the scope of utility right-of-way management—including restoring ecosystems, improving wildlife habitat, preserving cultural resources, protecting successional plant species, controlling invasive weeds, and other actions. Determining the best technique for a particular project takes experience and knowledge because natural conditions are dynamic. Therefore, this publication is not intended as a substitute for the expertise of a utility vegetation manager.

[1] United States Congress. P.L. 109-58, enacted August 8, 2005, section 1211

A utility vegetation manager is an individual engaged in the profession of vegetation management, who through education and related training, has the competence to design, implement, or supervise an IVM program. The expertise of a utility vegetation manager contrasts with that of an arborist insofar as the utility vegetation manager focuses on ecosystems, while arborists concentrate on individual trees. For the purposes of this publication, the utility vegetation manager is a utility employee or their contract representative who will set objectives, evaluate site conditions, make decisions on action thresholds and control methods, and perform quality assurance once work is complete.

IVM Defined

ANSI A300 Part 7 defines IVM as a system of managing plant communities in which managers set objectives, identify compatible and incompatible vegetation, consider action thresholds, and evaluate, select, and implement the most appropriate control method or methods to achieve their established objectives. The choice of control method or methods is based on considerations of their environmental impact and anticipated effectiveness, along with site characteristics, security, economics, current land use, and other factors.

Nowak (2013) offers a more in-depth definition of IVM, as a system for controlling undesirable vegetation that is consistent with principles and practices of Integrated Pest Management (IPM), designed to achieve specific management objectives, and continually improve processes. It is used to systematically choose, justify, selectively implement, and monitor different types of vegetation management treatments. Treatment selection is based on the control method's effectiveness, economic viability, and environmental impact, along with its suitability for safety, site characteristics, security, socioeconomics, and other factors. IVM uses combinations of methods to promote sustainable plant communities that are compatible with the intended use of the site, and to control, discourage, or prevent establishment of incompatible plants that may pose safety, security, access, fire hazard, utility service reliability, emergency restoration, visibility, line-of-sight requirements, regulatory compliance, environmental, or other specific concerns.

The key steps of IVM consistent with IPM are:

1) Gaining science-based understanding of incompatible vegetation and ecosystem dynamics;

2) Setting management objectives and tolerance levels based on institutional requirements and broad stakeholder input;

3) Selecting treatments from a variety of options, including biologcal, chemical, manual, mechanical, and cultural control methods—and applying them to promote desirable desired plant communities, with an emphasis on management through biological controls, and

4) Monitoring treatments to determine their necessity and effectiveness in creating desired plant communities and achieving management objectives. IVM is a sustainable management method for utility rights-of-way because it balances socioeconomic and environmental considerations.

IVM is not a set of rigid prescriptions based upon set time periods, repeated unselective mowing, or broadcast spraying across entire right-of-way widths without the objective of establishing diverse, compatible plant communities.

Safety

Utility vegetation management operations can be dangerous without rigorous training and strict adherence to proper safety procedures. For that reason, utility vegetation managers need to inspire a culture of safety throughout their organizations. They should employ only qualified professionals who have demonstrated their ability to work according to accepted safe practices, or qualified trainees dedicated to learning safe work practices.

In the United States, the Occupational Safety and Health Administration (OSHA) requires employers to train their workers in electric safety[2]. Annex B of the *American National Standard for Arboricultural Operations—Safety Requirements* (ANSI Z133-2012) contains guidelines for standard performance and safety training for qualified line clearance arborists. OSHA 1910.269 and ANSI Z133 complement one another on governing electric safety in arboricultural operations, with OSHA 1910.269 requiring electric safety training and ANSI Z133 offering guidance on how that training should be provided.

[2] OSHA. United States Department of Labor. 1910.269. Electric Power Generation, Transmission and Distribution. Accessed August 2013 <http://www.osha.gov/pls/oshaweb/owadisp.show_

1. Communication

Communication is essential to planning and implementing a successful vegetation management program. Proper communication should be open and interactive. It involves a formal, documented communication strategy for each phase of planning and implementation. The plan needs to entail more than just relating work instructions to vegetation crews. It should designate primary and secondary objectives and involve all stakeholders: management, other utility departments, planners, contractors, vegetation management crews, property owners, public land managers, appropriate governmental officials, members of organizations dedicated to related causes, and others.

Internal Communication

Communication within a utility's vegetation management department needs to be clear and concise to ensure everyone understands the desired results. Specifications and performance goals should delegate decision-making authority throughout the organization.

Communication among utility decision makers, including executives, engineers, corporate communications, operations managers, vegetation management staffs, and other utility departments should include why, where, when, and how IVM projects will be conducted. The discussion should emphasize the importance of the benefits of implementing IVM best practices. This is important because people within an organization but outside of the vegetation management department can help set priorities, anticipate and prevent potential problems, expand the communication network, and provide historical perspectives. Communicating with operations staff during work can also add a margin of safety. By knowing there is a vegetation management job underway, they may be able to respond more quickly to incidents and accidents than they would if they were unaware of the project.

Communication among utility vegetation managers, contract general foremen, supervisors, and workers should be both written and verbal. Written instructions ought to include the information needed to successfully complete a project, including specifications, policies and procedures, details about known stakeholders, locations of environmentally or culturally sensitive areas, applicable laws and regulations, and any other considerations of consequence. Debriefings should be planned to review challenges and lessons learned for future projects.

Communication with External Stakeholders

Public land managers, property owners, regulators, interest groups, and other affected parties often have legitimate concerns in utility vegetation management activities. It is important to communicate with them about the need for, benefits of, and science behind IVM to clarify expectations. Members of the vegetation management team, including crew members, should know the facts about the program, and be prepared to answer basic questions and refer more complex issues through proper channels. Communication should begin well in advance of work and involve listening to and understanding people's specific concerns. Modifications may be implemented to address legitimate issues, and these secondary objectives may be achieved provided those changes do not sacrifice primary management objectives of safety, reliability, and access.

Affected property owners and known stakeholders should be notified of upcoming work. Notification can be electronic or by mail, public notice, door hanger, personal visit, or other manner. In some cases, the best approach uses a combination of methods. Notification should include a brief explanation of when work is planned, why it needs to be done, its general location, a description of the project (e.g., mowing, herbicide, manual or other method), potential crew types, crew numbers, and other information that might help people understand the job. If property owners cannot be met in person, electronic or written notices may be used that contain contact numbers for use by those who need more information. In most cases, notification can be a proactive effort that informs stakeholders of the benefits of an IVM program.

Work on governmentally-managed property can involve administrative procedures that take months of advance work, including navigating through permit processes and the concerns of specialists who have responsibility for stewardship over public lands. Vegetation managers should educate land specialists on how IVM helps balance stewardship considerations with the need for providing safe, reliable service.

2. Planning and Implementation

ANSI A300, Part 7 offers a systematic way of planning and implementing a vegetation management program. It is applicable to distribution as well as transmission projects and consists of six elements:

1. Set Objectives
2. Evaluate the Site
3. Define Action Thresholds
4. Evaluate and Select Control Methods
5. Implement Control Methods
6. Monitor Treatment and Quality Assurance

Decisions are required in setting objectives, defining action thresholds, and evaluating and selecting control methods. The process is cyclical (Figure 2), because managing dynamic systems is ongoing. Managers must have the flexibility to adjust their plans at each stage as new information becomes available and circumstances evolve.

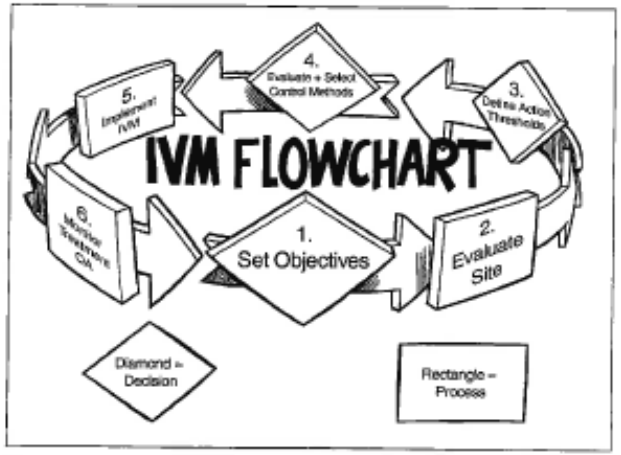

Figure 2. A300 Part 7 IVM flowchart.

Set Objectives

Objectives should be clearly defined and documented by the vegetation manager and be based on the intended purpose and use of the site. They should be SMART: specific, measurable, attainable, realistic, and timely. It is best to establish objectives that are precise and explain exactly what needs to be done, who needs to do it, and where it needs to be done. The objectives are measurable so progress can be impartially determined. Unattainable or irrelevant goals are pointless, and timeliness requires deadlines to drive completion of the goal (Duran 1981).

Examples of objectives for electric utilities can include promoting safety, preventing outages caused by vegetation growing into transmission facilities and minimizing them from trees growing outside the right-of-way, maintaining regulatory compliance, protecting structures and security, restoring electric service during emergencies, maintaining access and clear lines of sight, protecting the environment, and facilitating cost effectiveness. Metrics should be applied to each goal. For instance, a dollar per mile or acre goal could be set for a particular control method's cost effectiveness.

Objectives for pipelines can involve safety, route identification, testing, encroachments, and maintenance and inspection, particularly aerial and ground patrol needed for leak detection. Route identification is particularly important for underground facilities, which are only identified by above-ground markers or valves, and measuring stations adjacent to the pipeline, which can be easily hidden by unmaintained vegetation that has become overgrown. On gas pipeline rights-of-way, it's often best to select smaller, lower-growing plant species that are typically more sensitive to gas than larger, taller-growing trees in order to facilitate early gas leak detection. Border zone (see *Wire-border Zone Concept*) species could be selected that do not interfere with access for inspection, maintenance, or cause root obstruction. Tree roots may interfere with underground pipelines by compromising the coating integrity of some lines (Stedman and Brockbank 2012). A comparison of electric and pipeline rights-of-way concerns is presented in Table 1.

Objectives should be based on site factors, such as vegetation type, in addition to human, equipment, and financial resources. Objectives will vary from utility to utility and project to project, depending on line voltage or pipeline capacity and criticality, as well as logistical, topographical, environmental, fiscal, social, and political considerations. However, where it is appropriate, the overriding focus should be on environmentally-sound, cost-effective control of species that could potentially conflict with the facility, while promoting compatible, early successional, sustainable, plant communities.

Table 1. Electric vs. pipeline rights-of-way concerns (adapted from Appelt and Gartman 2004)

Electric rights-of-way	Pipeline rights-of-way
Electric right-of-way identification is obvious with lines and tall structures	Pipeline right-of-way identification for underground facilities is by markers, valves, and measuring stations that are easily obstructed by vegetation
Tree height under and to the side of lines, as well as distance to the side, effects safety and reliability	Trees block access and obstruct views
	Root intrusion (integrity of pipeline coating)

Site Evaluations

Site evaluations are used to assess field conditions for planning purposes. Planning can range from establishing programmatic strategies to setting detailed, tactical operational requirements for individual projects. The data can be applied to establishing or modifying objectives, setting budgets, or determining human, material and equipment resource requirements. Careful preparation is needed to ensure that valuable time and resources are directed toward obtaining useful information, but not wasted collecting unnecessary details. Site evaluations can identify a variety of factors, including potential safety issues, applicable regulations, workload, line or pipe type, voltage and criticality, funding, labor and equipment resource availability, height of the wire from the ground, right-of-way width, land ownership and use, fire risk, vulnerable or protected areas, presence of species of concern, water resources, archeological or cultural sites, topography, soils, and other matters.

Evaluations provide information on site characteristics that exist at the time an assessment is conducted. On dynamic systems such as those associated with IVM, information can quickly become out-of-date; meaning regularly-scheduled updates are required. Schedules should be based on anticipated vegetation growth, line design and construction, predominate species of vegetation, environmental factors, political considerations, budgetary parameters, and operational issues.

Work Load Evaluations

Workload evaluations are inventories of vegetation that could have a bearing on management objectives. Depending on those objectives and available resources, utilities can either conduct comprehensive or point sample evaluations. Workload assessments can collect data on an array of vegetation characteristics, such as location, height, density, species, size, condition,

tree risk, and clearance from conductors. Evaluations should be conducted considering voltage, conductor sag from ambient temperatures and loading, and the potential influence of wind on line sway.

Comprehensive Evaluations

Comprehensive evaluations account for all vegetation that could potentially affect management objectives. Program level comprehensive evaluations can be made of all target vegetation on a system, while project level evaluations focus on vegetation relevant to a specific job. Comprehensive evaluations provide the advantage of supplying a complete set of data upon which to base management decisions. On the other hand, comprehensive surveys can be impractical for utilities with large numbers of trees, limited human and financial resources, or both.

Tree Risk Assessment

Utilities should conduct assessments to identify trees or tree parts that could fail and threaten their facilities. Large numbers of trees managed by utilities present challenges in tree risk assessment and risk mitigation. Utilities often manage hundreds of trees for each mile (1.6 km) of right-of-way. Given the constraints that resource limitations can impose, it is unreasonable to expect them to monitor every tree that could potentially conflict with utility facilities, identify all those with existing defects that pose an unacceptable level of risk, and proactively remedy the risks they present. Moreover, utilities may be hindered from reducing potential tree risks by property owner opposition. The only plausible course of action is for utilities to manage risk rather than eliminate it (UAA 2009).

Utilities should develop and implement plans for patrolling and inspecting trees that could affect their facilities on a regularly scheduled basis. Standard inspections cover the strike zone, and identify trees with obvious defects among those trees sufficiently tall to hit facilities should they fall. FAC-003 (NERC 2008) requires North American utilities to inspect designated lines annually[3]. Evaluations may be conducted by ground, air, or both. Aerial inspections may be made using light detection and ranging (LiDAR [UAA 2009]). These inspections serve as level 1, or limited visual assessments. Level 1 assessments are conducted from a specified perspective to identify trees among a large population that have an imminent or probable likelihood of failure (Smiley, Matheny, and Lilly 2011).

If an initial level 1 assessment identifies a need for greater scrutiny, utilities may specify more detailed inspections or patrols, including a level 2, or basic assessment (Smiley, Matheny, and Lilly 2011). For utility application, a level 2 assessment is a detailed, 360-degree, ground-based visual inspection of the above-ground portion of a tree and its surrounding site to identify structural defects that could affect utility facilities. For the sake of efficiency, level 1 and level 2 assessments can be conducted simultaneously for trees requiring additional scrutiny.

Trees that have been identified as posing an unacceptable level of risk require an abatement plan. Each utility should have a plan and procedure in place for assessing and addressing high-risk trees, which specifies responsibility for prescribing and executing the plan (UAA 2009). When trees that pose an imminent threat to subject transmission facilities are identified, FAC-003 (NERC 2008) requires transmission owners to notify the appropriate switching authority that vegetation is likely to cause an outage at any moment.

Utility arborists interested in more detailed tree risk assessment information are directed to the *Utility Best Management Practices Tree Risk Assessment and Abatement for Fire-prone States and Provinces in the Western Region of North America* (UAA 2009) and the International Society of Arboriculture's *Best Management Practices: Tree Risk Assessment* (Smiley, Matheny, and Lilly 2011).

Point Sample Evaluations

Point sampling offers an alternative for utilities for which comprehensive inventories are impractical. While point sampling is inappropriate for hazard tree mitigation, it is cost effective, and has a proven track record for reasonable accuracy for other types of workload evaluation. It can be used to project the total amount of work from a representative sample. A common method involves dividing a management area (a system or project) into equal-sized units and selecting a random sample sufficient to statistically represent the total work quantity. Random selection eliminates the chance of bias on the part of the investigator. Every plant or plant community of interest within each selected area is inventoried, with collected data used to forecast the total workload.

Define Action Thresholds

Vegetation managers shall define action thresholds that initiate implementation of control methods to achieve management objectives. Action thresholds

[3] Lines 200 kV or greater or those designated by a planning coordinator as an element of an interconnection reliability operating limit or by the Western Electricity Coordinating Council (WECC) as an element of a major designated by or as an element of a WECC major critical path (NERC 2008).

are vegetation height, density, location, or condition targets that trigger specific control methods. Since thresholds will vary from utility to utility and project to project, they should be set by a utility vegetation manager. Thresholds should be established in advance to meet objectives and be based on the results of site evaluations. A cycle based on an established period of time is often not an appropriate action threshold, because changes in growth rates, facility use, and land development will affect when vegetation needs to be controlled. Consequently, inspection and maintenance schedules should be based on existing vegetation, expected growth rates, past control methods, and action thresholds.

Minimum Clearances

Minimum clearance requirements may be established by regulatory oversight, or by individual utilities, to achieve management objectives. When establishing minimum clearances for energized conductors, practitioners must at least consider:

- the potential growth of vegetation
- the combined movement of vegetation and conductors in high wind
- sag of conductors due to elevated temperatures or icing

Vegetation managers must be aware that IVM requires a broader, more preventative approach than simply maintaining minimum clearances.

The objective of most IVM programs includes preventing the establishment of incompatible vegetation. Trees that have grown to the point where sparkover or an interruption to service is likely at any moment indicate a breakdown of the IVM program. Action thresholds in IVM are used to determine when incompatible vegetation control is necessary long before it has the potential to violate minimum clearance requirements or cause a service interruption. Using an IVM approach is both economically and environmentally sound because preventing establishment of incompatible vegetation is both less costly and less intrusive than removing or pruning large, established trees.

Evaluate and Select Control Methods

Control methods are the processes through which managers achieve objectives. The most suitable control methods are those that best achieve management objectives at a particular site. Many cases call for a combination of methods. Managers have a variety of controls from which to choose, including manual, mechanical, chemical (herbicide and tree growth regulators), biological, and cultural options. The ultimate objective is to maintain a desirable plant community with available tools, emphasizing biological and ecological control.

Manual Control Methods

Manual methods are performed by workers using hand-carried tools, such as chain saws, handsaws, pruning shears, and other devices to control incompatible vegetation. The advantage of manual techniques is that they are selective and can be applied where others may not be appropriate. On the other hand, manual techniques can be inefficient, less safe, more intrusive, more expensive, and not as environmentally friendly as other methods.

Mechanical Control Methods

Mechanical controls are done using machines. They are efficient and cost effective, particularly for clearing dense vegetation during initial right-of-way establishment or for reclaiming neglected or overgrown rights-of-way. On the other hand, machines may have a greater negative environmental impact than other control methods. Mechanical control methods can be nonselective; destroy compatible vegetation; disturb sensitive areas such as wetlands, archeologically rich localities or developed areas; establish a seedbed for and dispersal of incompatible plants through ground agitation; and carry seasonal restrictions to prevent harm to nesting wildlife and the environment. Machines can leave behind petroleum products from normal operations, leaks, and spills. Furthermore, heavy equipment use can be risky to use on steep terrain, where it can be unstable and contribute to erosion. To safely achieve desired end results, machinery must be properly maintained and run by skilled equipment operators.

Figure 3. Tractor-mounted mower.

Machine Types

There are many machines that can be used for IVM. Machines efficiently remove undesirable vegetation on large-scale operations, such as initial right-of-way clearing or reclamation. Examples include:

- *Mowers* (Figures 3 and 4) not only remove and grind brush, but they can also fell small trees. Grinding and scattering improves aesthetics, facilitates debris decomposition, reduces fuel loads, and minimizes fire hazard. Appropriate timing and frequency can affect plant community development.
- *Shears* are whole tree removal devices mounted on heavy equipment. Shears can fell, lift, and stack trees (Figure 5).

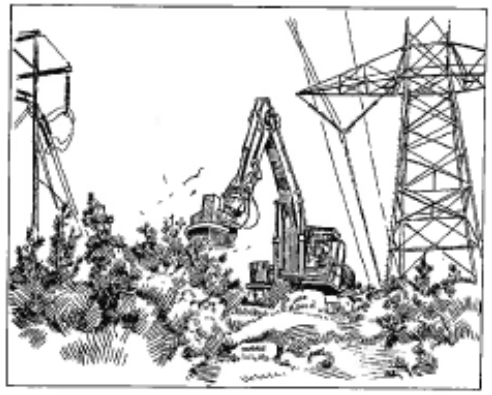

Figure 4. Excavator-mounted mower.

- Mechanized *pruning* can be done with all-terrain vehicles equipped with an extendable boom (commonly 75 ft or 25 m) that can extend a circular saw blade (Figure 6). It can also be done with an array of blades slung beneath a helicopter. These devices can prune trees quickly and efficiently. However, it can be difficult to be precise with mechanized pruning equipment. Wounds that result are inappropriate for landscape or high-value trees. Consequently, mechanical pruning equipment use should be limited to rural or remote areas.

Figure 5. Feller-buncher.

- *Aerial lifts* can provide production efficiencies and safety. They can be mounted on a variety of chassis, from trucks to all-terrain vehicles, which can work off road (Figure 7).

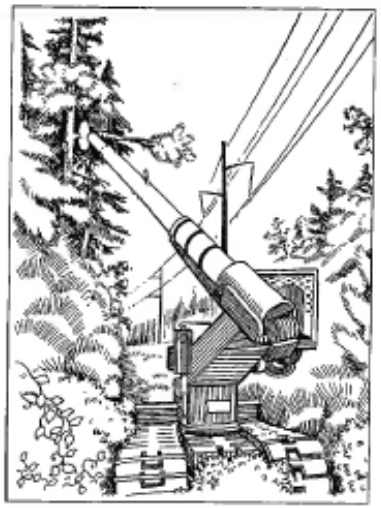

Figure 6. Mechanical pruner.

Figure 7. Off-road aerial lift.

Chemical Control Methods

Chemicals must be applied by qualified applicators according to label directions. Applicators are not only required to read and comply with label instructions, but also all other laws and regulations pertaining to chemical use. Label instructions for personal protective equipment (PPE) are particularly important. Most commonly used herbicide formulations only require long-sleeved shirts, long pants, and shoes and socks. Some formulations require resistant gloves and protective eye wear. Preference should be given to using chemicals that minimize risk to humans and the environment. Emphasis shall also be given to techniques that reduce the amount of material applied over time.

Tree Growth Regulators

Tree growth regulators (TGRs) are substances designed to reduce growth rates by interfering with natural plant processes. By slowing growth rates of some fast-growing species, TGRs can be helpful where removals or cover type conversion are prohibited or impractical, such as in urban forest applications. TGRs have not been demonstrated to be economically effective on large-scale, rural transmission facilities; however, they have proven useful in specific locations, primarily on distribution lines.

Herbicides

Herbicides control plants by interfering with specific botanical biochemical pathways. There are a variety of herbicides, each of which affect plants in different ways and behave variously in the environment, depending on the formulation and characteristics of the active ingredient. While appropriate herbicide use reduces the need for future intervention, misused herbicides can carry environmental risks due to drift, leaching, and volatilization.

When properly applied, herbicides are effective and efficient, while minimizing soil disturbance and enhancing plant and wildlife diversity. Herbicide application can benefit wildlife by improving forage as well as escape and nesting cover. In some instances, noxious weed control is a desirable objective on utility rights-of-way that can be satisfied through herbicide treatment.

Herbicide use can control individual plants that are prone to re-sprout or sucker after removal. When trees that re-sprout or sucker are removed without herbicide treatment, dense thickets develop—impeding access, swelling workloads, increasing costs, blocking lines-of-site, and degrading wildlife habitat (Figure 8). Treating suckering plants allows compatible early successional species to dominate the right-of-way and out-compete incompatible species, ultimately reducing work.

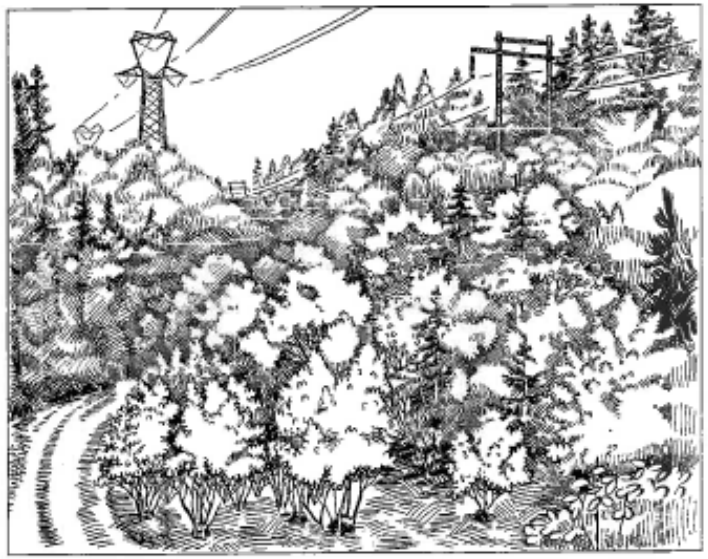

Figure 8. Sprouting from cut stumps.

Closed Chain of Custody

Traditionally, herbicides have been supplied in concentrated forms in non-returnable containers. This requires handling open containers of concentrate on job sites for mixing and loading. Advances in chemistry and application methods have significantly reduced the volume of herbicide solutions applied. These advances have made it practical to adopt a closed chain of custody concept in which ready-to-use and diluted concentrate formulations are utilized in closed delivery systems (Figure 9)—a practice that further protects the applicator and environment (Goodfellow and Holt 2011).

The closed chain of custody concept includes herbicide shipping, distribution, storage, and mixing, and includes returning empty containers for refilling and reuse. It involves four cycles (Goodfellow and Holt 2011):

- *Container cycle*: supply containers are returned, refilled, and reused
- *Integrity cycle*: closed connections at the transfer points between supply containers, mix tank, and application equipment
- *Documentation cycle*: a container tracking system that establishes an auditable record documenting movement of herbicides and containers
- *Herbicide cycle*: use of customer blends containing the required active ingredient and adjuvants

Figure 9. An interlocking valve connection between fill hose and backpack is preferred.

The Utility Arborist Association (UAA) and ISA have produced best management practices for closed chain of custody for herbicides in the utility vegetation management industry (Goodfellow and Holt 2011). Readers are encouraged to consult these best practices for further information on the subject.

Selectivity

Herbicides can be selective or nonselective depending on their type. Selective herbicides only control specific kinds of plants when applied according to the label. For example, synthetic auxins are a class of selective herbicides that control broadleaved plants, but do not harm grass species. By contrast, nonselective herbicides work on both broadleaved plants and grasses.

Application techniques can be either selective or nonselective. Selective applications are used against specific plants or pockets of plants. Nonselective techniques target areas rather than individual plants (see *Herbicide Application Methods*). Nonselective use of nonselective herbicides eliminates all plants in the application area. Nonselective use of a selective herbicide controls treated plants that are sensitive to the herbicide, without affecting plants with low sensitivity. Selective use of either would only control targeted vegetation. Selective use is preferable unless target vegetation density is high.

Herbicide Application Methods

Herbicide application methods are categorized by the quantity of herbicide used, the character of the target, vegetation density, and site parameters. Dyes can be used in the herbicide mix to mark areas that have been treated. Application methods include individual stem, broadcast, and aerial treatments.

Individual Stem Treatment

Individual stem treatments are selective applications. They include stump, basal, injection, frill (hack and squirt), selective foliar, and side-pruning applications (Table 2). Because they are applied selectively, proper individual stem applications work well to avoid damage to sensitive or off target plants. However, this treatment is impractical for large areas or for sites dominated by undesirable species.

Table 2. Herbicide treatment methods.

Individual Stem	Broadcast	Aerial
Stump	High volume foliar	Fixed wing
Basal	Low volume foliar	Rotary wing
Injection	Cut stubble	
Frill	Bare ground	
Selective foliar (low and high volume)		
Sidepruning		

Stump applications are a common individual stem treatment in which herbicides are applied to the cut stump surface around the cambium and top side of the bark (Figure 10). Water-based formulations require immediate stump treatment, while vegetable oil-based herbicides can be put on hours, days, or even weeks after cutting.

Figure 10. Stump treatments are a common individual stem treatment where herbicides are applied to the cut stump surface around the cambium and top side of the bark.

Injection involves injecting herbicide into a tree, while frill treatments consist of herbicide application into wounds made in the trunk. Injections or frill treatments are especially useful against large incompatible trees to be left standing for wildlife.

Basal applications often use an herbicide in a vegetable oil carrier applied to the base and encircling stems and the root collars (Figure 11). The vegetable oil penetrates the bark, carrying the herbicide into the plant. Although basal applications can be made year round, dormant treatment is often best on deciduous

Figure 11. Basal application

plants, when they do not have foliage that can obstruct access to individual stems and are not covered by snow or ice.

Selective foliar applications are done by spraying foliage and shoots of specific target plants (Figure 12). They can be either low or high volume treatments. For low volume applications, comparatively high concentrations of herbicide active ingredient are made in lower volumes of water than would be used with high volume treatment. Foliar applications are only made during the active growing season, normally late spring to early fall.

Figure 12. Selective foliar application.

Chemical side pruning is a technique where non-translocatable herbicides are applied to foliage of specific branches growing toward the electric facility, causing them to defoliate and eventually be shed by the tree.

Broadcast Treatment

Broadcast treatments are nonselective because they control all plants sensitive to a particular herbicide in a treatment area. They can provide a degree of selectivity if used with selective herbicides. Even then, broadcast treatments do not differentiate between compatible and incompatible plants that the herbicide controls. Broadcasting is particularly useful to control large infestations of incompatible vegetation (including invasive species) in rights-of-way or along access roads.

Broadcast techniques include high- or low-volume foliar, cut-stubble, and bare-ground applications. High-volume foliar applications are similar to high-volume selective foliar applications. The difference is that broadcast high-volume foliar treatments target a broad area of incompatible species rather than individual plants or pockets of plants. Low-volume foliar treatments are applied similarly, but with specialized nozzles and thin inversion formulations that minimize volume and spray drift.

Cut-stubble applications are made (using either high- or low-volume broadcast treatments) over areas that have just been mowed. Bare-ground treatments are used for clearing all plant material in a prescribed area, such as in substations or around poles, to protect against fire. Bare-ground applications are usually granular or liquid applications following mechanical removal of vegetation, or used as a pre-emergent in maintaining graveled areas, such as substation enclosures.

Aerial Treatments

Aerial treatments are made by helicopter (rotary wing) or small airplane (fixed wing). Rotary wing aircraft provide the most accuracy, because helicopters can hover, are more maneuverable, and can fly more slowly than airplanes. However, airplanes are less expensive to operate than helicopters. Aerial control methods are nonselective, but may provide a level of selectivity if used with proper herbicides. Aerial applications can be useful in remote or difficult-to-access sites, and can be quick and cost effective, especially if large areas need to be treated. They can also be used where incompatible vegetation dominates a right-of-way or vegetation height limits ground-based treatments. The primary disadvantage of aerial application is that it carries the threat of off-target drift. To limit drift, work must be performed under low-wind conditions with specialized nozzles and formulations.

Biological Control Methods

Biological control is management of vegetation by establishing and conserving compatible, stable plant communities, using plant competition, animals, insects, or pathogens. For example, some plants, including certain grasses, release chemicals that suppress other plant species growing around them. Known as allelopathy, this characteristic can serve as a type of biological control against incompatible species. Promoting wildlife populations is also a form of biological control. Birds, rodents, and other animals can encourage compatible plant communities by eating seeds or shoots of undesirable plants.

A biological control known as cover-type conversion provides a competitive advantage to short-growing, early successional plants, allowing them to thrive and successfully compete against unwanted tree species for sunlight, essential elements, and water. Early successional plant communities are relatively stable and tree-resistant. This control method reduces the amount of work, including herbicide application, with each successive treatment. While it is a type of biological control, cover-type conversion may require the use of one or more other control methods—such as manual, mechanical, herbicide, or cultural—depending on conditions.

Tree-resistant communities are often created in two stages.The first involves nonselectively clearing the right-of-way of undesirable trees using the best applicable control method or combination of methods. The second stage involves developing a tree-resistant plant community using selective techniques, including herbicide applications, that opens an area to sunlight and encourages an often long-dormant seed reservoir of compatible species to germinate. In the long run, this type of biological control is the most desirable method, at least where it can be done effectively.

Cultural Control Methods

Cultural methods modify habitat to discourage incompatible vegetation and establish and manage desirable, early successional, and other compatible plant communities. Examples of cultural control include seeding, planting low-growing crops, and establishing pastures, prairies, compatible landscapes, and other managed areas. Fertilization and irrigation are techniques that may be used to help establish low-growing, compatible plant communities.

Engineering Solutions

While they are not vegetation control methods, engineering solutions can provide relief from vegetation-power line conflicts. They can include relocating, reconstructing, or burying lines. The disadvantage of engineering solutions is that they are often unaffordable for adjacent property owners or not cost-effective for utilities and their ratepayers. They can also have detrimental environmental impacts if inappropriately applied (Goodfellow 1995).

Wire-Border Zone Concept

The wire-border zone concept is a management philosophy that can be applied through cultural control. W.C. Bramble and W.R. Byrnes developed the concept in the mid-1980s out of research begun in 1952 on a transmission right-of-way in the Pennsylvania State Game Lands 33 Research and Demonstration project (Yahner and Hutnick 2004).

The wire zone is the section of a utility transmission right-of-way under the wires and extending on both sides to a specified distance (Bramble, Yahner and Byrnes 1992). The standard way to establish the wire zone is by a set measure (e.g., 10 ft [3 m] or another length) on each side of the wires. Goodfellow (2013) suggests demarcating the wire zone under the wires at a distance equal to 60% of phase-to-phase spacing on the border side of the outside conductors. The wire zone is managed to promote a low-growing plant community dominated by grasses, herbs, and small shrubs (e.g., under 3 ft [1 m] in height at maturity).

The border zone is the remainder of the right-of-way (Figure 13). It is managed to establish small trees and tall shrubs (under 25 ft [7.5 m] in height at maturity). The concept may be modified to accommodate side slope (Figure 14). When properly managed, diverse, tree-resistant plant communities develop in wire and border zones. These plant communities not only protect the electric facility and reduce long-term maintenance, but also enhance wildlife habitat, forest ecology, and aesthetic values.

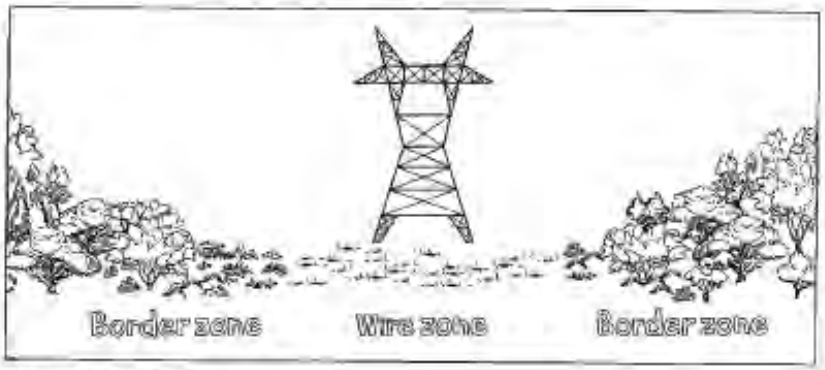

Figure 13. Wire-border zone.

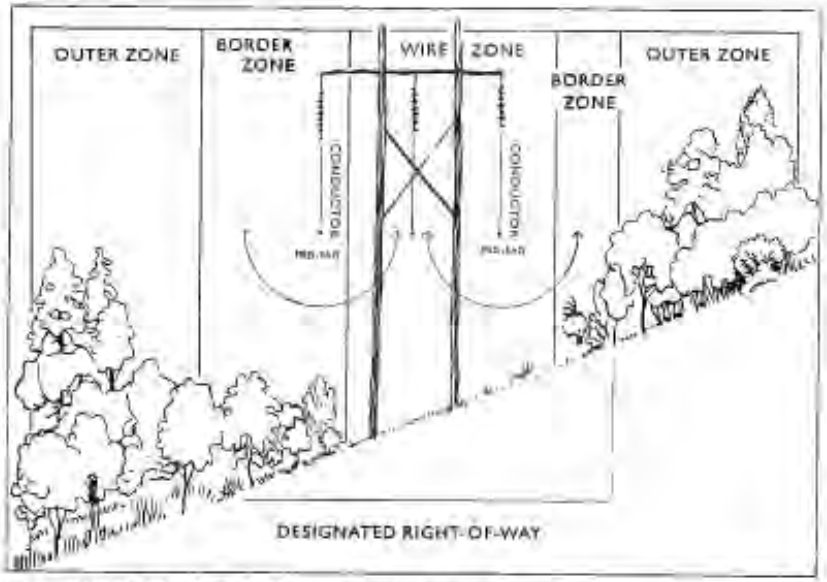

Figure 14. Modification of wire-border zone for side slope.

Although the wire-border zone concept is a best practice in many instances, it is not necessarily universally suitable. For example, standard wire-border zone prescriptions may be unnecessary where lines are high off the ground, such as across low valleys or canyons. One way to accommodate topography changes is to vary zones based on wire height. For example, vertical zones could be established over low valleys, or canyon bottoms, or other areas where conductors are high above the ground (e.g., 100 ft [30 m], or height mangers deem appropriate for a specific region), where only a few trees are likely to be tall enough to conflict with the lines (Figure 15). In those instances, trees that potentially interfere with transmission lines can be removed selectively on a case-by-case basis. In areas where the wire is lower, perhaps between 50-100 ft (15-30 m) over the ground, a border zone community could be developed throughout the right-of-way. Where the line is lower, less than 50 ft (15 m) off the ground, for example, managers could apply a full wire-border zone prescription. These modifications have many advantages. Removing fewer trees in valleys and canyons has environmental benefits. Streams often course through the valleys and canyons where lines are likely to be elevated. Leaving timber or border zone communities in valley and canyon bottoms helps shelter this valuable riparian habitat (see *Stream Protection*). It also has economic benefits, as unnecessarily removing trees is a waste of money.

Strict adherence to wire-border zone methodology may also be inappropriate in some fire protection jurisdictions, where border zone establishment is often discouraged out of concern it could provide ladder fuels to the adjacent forest. In these and other cases, management objectives could call for a perennial meadow or prairie plant community throughout the right-of-way. Meadows and

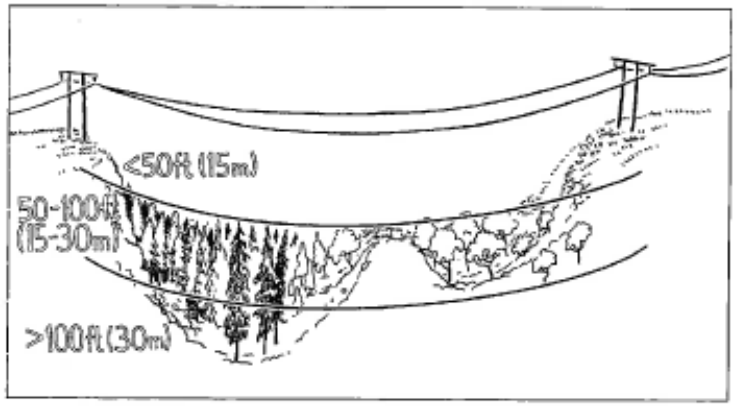

Figure 15. Wire-border zone for elevation of wire off ground.

prairies are legitimate, tree-resistant plant communities that can be established through IVM. The wire-border zone concept is a useful tool in situations where it meets management objectives as determined by utility vegetation managers.

Pipe zone-border zone

The wire-border zone concept can be modified to meet IVM objectives on many pipeline rights-of-way (Figure 16). The height and type of vegetation should meet management objectives. Over the pipe zone, native prairie forbs and grasses may be encouraged. Dense, low-growing, gas-sensitive, green cover could also be introduced into the pipe zone if desired. Taller-growing, compatible vegetation can be managed on the edges of the pipeline right-of-way, where it will not interfere with maintenance or pipe integrity. If prairie or other grasses are so tall that they interfere with testing or maintenance, a narrow path directly over the pipe can be mowed, without disturbing the remainder of

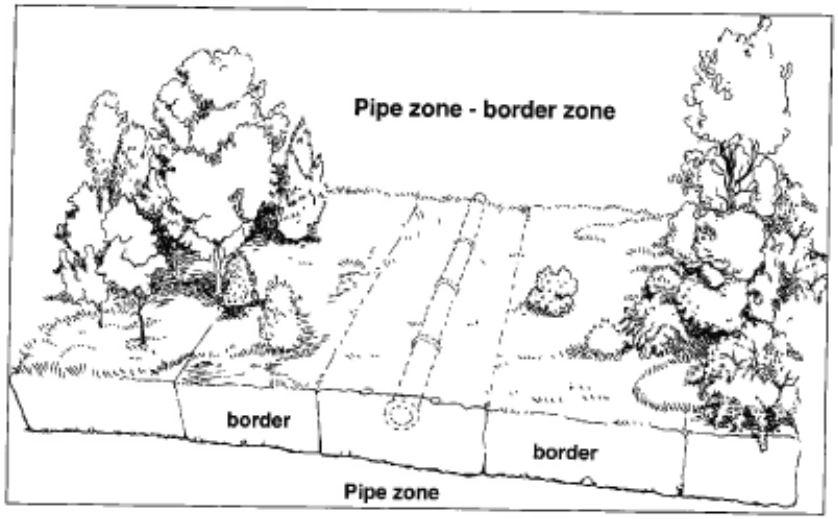

Figure 16. Pipe-border zone.

the right-of-way. This would result in the need for periodic strip-mowing, with low economic and environmental costs and greater benefits for certain wildlife species (Stedman and Brockbank 2012, Johnstone 2012).

Implement Control Methods

All laws and regulations governing IVM practices and specifications written by utility vegetation mangers must be followed. Integrated vegetation manage-

ment control methods should be implemented on regular work schedules, which are based on established objectives and completed assessments. Work should progress systematically, using control measures determined to be best for varying conditions at specific locations along a right-of-way. Some considerations used in developing schedules include the importance and type of line, vegetation clearances, workloads, growth rate of predominant vegetation, geography, accessibility, and in some cases, time elapsed since the last scheduled work.

Initial Clearing and Reclamation

Initial clearing of new and reclaiming of neglected rights-of-way requires nonselective techniques, at least in areas dominated by incompatible vegetation. Subsequent projects on those rights-of-way can selectively target incompatible plants, working toward cover-type conversion.

Clearances

The system operator should establish and document appropriate clearance distances or vegetation heights to be achieved at the time of work. A utility vegetation manager should determine appropriate vegetation conditions, including clearances, throughout the system. Following work, vegetation on the right-of-way should consist of a height and species mix that meets management objectives, including reducing electric and gas safety and service-reliability threats, protecting the environment, and controlling costs. Achieving mandated minimum vegetation clearance distances (such as the minimum vegetation clearance distance [MVCD] in FAC-003 [NERC 2008]), while technically in compliance with regulations, is not in and of itself a best management practice. Nor should it be used as a limitation for managing vegetation on a right-of-way, or evaluating the efficacy of IVM operations. Doing so would allow the establishment of incompatible trees on the right-of-way, which would require periodic topping or severe pruning. In addition to creating unacceptable ongoing risk to facilities, tree maintenance operations can unnecessarily place workers at risk. Managers should bear in mind that clearances are just one objective out of many. The best practice is to remove incompatible trees, encourage compatible vegetation, and ensure— through ongoing monitoring and maintenance— that trees do not become established in these areas or have opportunities to violate minimum clearance requirements.

Debris Disposal

Debris such as logs and slash that result from IVM operations should be handled in a manner compatible with adjoining land use, terrain, aesthetics, wildlife habitat, and fire risk. Logs may be recoverable for firewood or timber products, and are often best left for the property owner or as wildlife habitat. Slash can be placed into piles, windrowed along rights-of-way edges, or lopped and scattered. Some jurisdictions may limit the height and length of slash piles. Neither slash nor logs should be placed below the high water mark of streams or other bodies of water, unless requested by a competent authority. Logs should not be moved from the work site if they are likely to be infested with an epidemic-causing disease or insect pest. Where appropriate (e.g., in remote areas or in wildlife management areas), dead standing timber that cannot strike the line or violate mandated minimum clearance requirements can be left as wildlife habitat.

Monitor Treatment and Quality Assurance

An effective IVM program must have documented processes to evaluate results. Evaluations can involve quality assurance while work is underway and after it is completed. Monitoring for quality assurance should begin shortly after work begins to correct any possible miscommunication or misunderstanding on the part of crew members. Early and consistent observation and evaluation also provides an opportunity to modify the plan, if necessary, in time for a successful outcome.

Utility vegetation management programs should have systems and procedures in place for documenting and verifying that vegetation management work was completed to specifications. Post-control reviews can be comprehensive or based on a statistically representative sample. The results should be compared to objectives, referencing the baseline surveys completed earlier in the planning process. A review of environmental, customer, archeological, or other outcomes may also be necessary, along with property owner and stakeholder surveys. This final review can identify additional work to be completed or highlight opportunities for improved management. The first step in the IVM process of planning and setting objectives then begins again (Figure 2).

Record Keeping

Records are necessary for quality assurance and future planning. The type of information needed is best determined by the utility vegetation manager. Relevant data commonly includes details on land ownership, the date of pre-notification, and access routes. Records should be digitized and reflect dates of communication, names of stakeholders, and the nature of discussions with them, including any commitments. Records should also be maintained on the type and voltage of line or pipeline capacity, along with work dates,

methods, and location. Where appropriate, records should be maintained on threatened and endangered species and other considerations.

Herbicide records are required by law. Applicators should identify themselves, note the herbicide trade name, the active ingredient, and in the United States, the EPA number. Applicators also need to track the amount of herbicide applied, the location of the application, weather conditions at the time of treatment, how many trees or acres were treated, and other relevant factors.

3. IVM Application

Environmental Protection

Species of Concern

Vegetation management should not disturb or harm species of concern (i.e., rare, threatened, endangered, or otherwise protected species). Utility vegetation managers need to obey appropriate guidelines and regulations. Often, simple adjustments can be made to protect sensitive species without compromising desired outcomes.

Wetlands

Wetlands should be worked using suitable control methods. If herbicides are to be applied, only those labeled for use over water may be used in wetlands.

Stream Protection

To protect streams, incompatible vegetation may need to be selectively pruned or removed, or treated with appropriate herbicide to gradually establish a compatible riparian plant community. Equipment may only use existing or designated stream crossings.

Buffers

Stream crossings of right-of-way corridors, surface water supply reservoirs, and drinking water wells and springs need to be protected by buffers. Buffers should retain as much compatible vegetation as possible. If herbicides are needed within the buffer, only those appropriate for the site should be applied. Machine work should be avoided in buffers as equipment may leak or spill petroleum products, causing pollution or erosion. Utility vegetation managers, working along with competent authorities, should determine appropriate distances for particular buffers.

Archeological or Cultural Sites

Vegetation management activities should not disturb known archaeological or cultural sites. When necessary, archeological sites should be located and marked, and a plan established to adequately protect them during work. Field data inventories of known sites should be kept on file. Practices that won't damage the sites, such as manual cutting and backpack or aerial herbicide applications, should be considered for use at these locations.

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4. Tree Pruning and Removal

Pruning for clearance of trees within pipeline and electric transmission rights-of-way is generally inconsistent with IVM management objectives. However, it may be necessary in rare cases involving legal restrictions. Electric distribution lines are often maintained with pruning as a part of an overall IVM strategy. When pruning is necessary, it should be conducted according to the most current version of the ANSI A300, Part 1:*Tree, Shrub, and Other Plant Management—Standard Practices (Pruning)* and ISA's *Best Management Practices: Utility Pruning of Trees* (Kempter 2004). Structurally unsound or dead trees located off the right-of-way in remote areas may be left for wildlife by reducing them in height so they will no longer strike the electric facility should they fall.

5. Summary

Integrated vegetation management—as presented in ANSI A300 Part 7 (ANSI 2012), and when implemented according to principles established by the work of peer-reviewed researchers, long-standing demonstration projects, and successful utility programs—offers a systematic way of planning and implementing a comprehensive, cost-effective, environmentally-sound vegetation management program that meets primary utility objectives and addresses legitimate stakeholder concerns. It consists of six elements:

1. Set Objectives
2. Evaluate the Site
3. Define Action Thresholds
4. Evaluate and Select Control Methods
5. Implement Control Methods
6. Monitor Treatment and Quality Assurance

Managers should select control options to best promote management objectives. Tree-resistant plant communities can be a desirable objective to reduce long-term workloads and costs because, once established, they out-compete incompatible plants. When effectively applied, IVM is a systematic, preventive strategy that results in site-specific treatments to meet management objectives. A sound program includes documented processes to evaluate results, which should involve both monitoring for quality assurance while work is underway and after it is completed. However, the overriding focus should be on environmentally-sound, cost-effective control of species that potentially conflict with the electric facility, while promoting compatible, early successional, sustainable plant communities.

6. Glossary

abatement plan–a process for reducing vegetation risk.

action thresholds–a point at which the level of incompatible plant species, density, height, location, or condition threatens the stated management objectives and requires implementation of a control method(s).

allelopathy–the production of chemicals by one plant species that can suppress or kill other species.

ANSI A300–the *American National Standard for Tree Care Operations—Tree, Shrub, and Other Woody Plant Management—Standard Practices*. American national arboricultural consensus standard series for tree care operations.

biological methods–management of vegetation by establishment and conservation of compatible, stable plant communities using plant competition, allelopathy, animals, insects, or pathogens. Cover-type conversion is a type of biological control.

best management practices–in the context of utility vegetation management, a best management practice is the most effective, safe, economical, and environmentally-sound procedure or procedures for maintaining utility rights-of-way. *Best Management Practices* is also the title of a series of booklets produced and published by the International Society of Arboriculture, which serve as companion documents to the ANSI A300 series.

border zone–a section of a transmission or pipeline right-of-way that extends from the wire or pipe zone to the right-of-way edge. The border zone is managed to promote a low-growing plant community of forbs, tall shrubs, and low-growing trees below a specified height (e.g., 25 ft or 7.5 m).

brush–standing woody stems (live or dead) less than 4 in (10 cm) in diameter at breast height (4.5 ft [1.35 m]).

bulk transmission–see *transmission lines*.

chemical control methods–management of incompatible vegetation through the use of herbicides or growth regulators.

closed chain of custody–an end-to-end process of documented ownership for herbicides, adjuvants, and containers from manufacturer through application, and the return of returnable, reusable containers to a customer blender for refilling and reuse (Goodfellow and Holt 2011).

compatible vegetation–vegetation that is desirable or consistent with the intended use of the site. For example, plant species that will never grow sufficiently close to violate minimum clearance distances with electric conductors.

cover-type conversion–a type of biological control where a stable, tree-resistant plant community is developed using selective techniques that opens an area to sunlight and encourages desirable plants to out-compete undesirable vegetation in a right-of-way.

cultural methods–management of vegetation through alternative use of the right-of-way that precludes growth of incompatible vegetation through establishment of crops, pastures, prairies, parks, successful cover-type conversion, or other managed landscape.

debris–material such as slash, logs, or chips left after right-of-way clearing or maintenance operations.

distribution lines–high voltage lines generally energized between 4kV and 22kV, but can range from 600v to 35kV. Distribution lines usually serve commercial and residential customers.

early-successional plant communities–plant communities that first develop following disturbance. Succession is the replacement of one plant community by another. Cover-type conversion in a utility context inhibits successional progress past an early stage.

frilling–a method of herbicide application where tools are used to remove the bark of target woody plants, and herbicide is applied to the wound.

hack and squirt–see *frilling*.

hazard tree–a tree that has been assessed and found to be likely to fail and cause an unacceptable degree of injury, damage, or disruption. Hazard trees pose a high or extreme risk (Smiley, Matheny and Lilly 2011).

herbicide–a pesticide used to kill, slow, or suppress plant growth by interfering with botanical pathways.

imminent threat–a vegetation condition that could cause damage or interruption of service to overhead energized facilities or pipelines at any moment.

incompatible vegetation–vegetation that is undesirable, unsafe, or interferes with the intended use of the site.

integrated pest management (IPM)–an ecologically-based strategy for long-term damage prevention caused by pests using a combination of techniques

integrated vegetation management (IVM)–a system of managing plant communities based in IPM, where managers identify compatible and incompatible vegetation, consider action thresholds, evaluate control methods, and select and implement controls to achieve specific objectives. The choice of control methods is based on the anticipated effectiveness, environmental impact, site characteristics, safety, security, economics, and other factors.

ISA–International Society of Arboriculture.

kV–1000 volts.

level 1 or limited visual tree risk assessment–periodic, visual assessment of trees within the strike zone, in order to identify obvious defects that could cause a tree or tree part to fall directly on an overhead high-voltage conductor. Level 1 assessments are conducted from a specified perspective such as foot, vehicle, or aerial patrol to identify a tree or trees among a population that have an imminent or probable likelihood of failure (Smiley, Matheny and Lilly 2011).

level 2 or basic tree risk assessment–detailed visual inspection of a tree and surrounding site that may include the use of simple tools. It requires that a tree risk assessor walk completely around the tree trunk looking at the site, aboveground roots, trunk, and branches (Smiley, Matheny and Lilly 2011).

line–a distribution or transmission electric facility including wire, poles, and attachments.

logs–woody stems greater than 6 in (15 cm) in diameter that result from tree or large branch removal.

low-growing plant community–a population of plants that have a low mature height (e.g., 3 ft [1 m] or less). Examples include grasses, shrubs, forbs, and herbs. Low-growing plant communities can often effectively compete with trees and tall-growing shrubs for sunlight, essential elements, and moisture. Once established, low-growing plant communities are relatively self-sustaining and can be maintained with a minimum of intervention.

maintenance cycle–planned length of time that must be maintained between vegetation management activities.

manual methods–vegetation cutting or removal using tools carried by hand.

mechanical methods–vegetation removal using machines such as mowers, rubber-tire or tracked tractors, or excavators.

minimum vegetation clearance distance (MVCD)–a calculated minimum distance stated in feet (or meters) to prevent spark-over, for various altitudes and operating voltages, that is used in the design of transmission facilities. Keeping vegetation from entering this space will prevent transmission outages.

National Electrical Safety Code® (NESC)–a standard in the United States covering basic provisions for safeguarding persons from hazards resulting from installation, operation, or maintenance of conductors and equipment in electric supply stations, overhead and underground electric supply, and communication lines. It also contains work rules for construction, maintenance and operations of electric supply, and communication lines and equipment.

nonselective management–method of controlling vegetation without regard to whether or not the vegetation is desirable or undesirable.

pipe zone-border zone–an adaptation of the wire-border zone concept for pipeline rights-of-way. The pipe zone is an inspection area corresponding to the wire zone and is comprised of low-growing species (Stedman and Brockbank 2012).

right-of-way–a corridor of land used for a specific purpose such as an electric transmission or pipe line. (plural: rights-of-way.)

right-of-way reclamation–establishing IVM on a right-of-way that has not been managed to the full extent of its easement or ownership rights and intended purpose. Reclamation usually involves initial nonselective control techniques.

risk–the combination of the likelihood of an event and the severity of the potential consequences. In the context of IVM, risk is the likelihood of trees, tree parts, or other vegetation falling onto—or growing into—utility facilities, causing damage and/or interrupting utility services, combined with the severity of the potential consequences.

selective management–methods used to target undesirable vegetation while retaining desirable vegetation.

slash–non-standing debris less than 6 in (15 cm) in diameter left after right-of-way clearing operations.

spark-over–a luminous discharge of electricity through a gap between two conductive objects (e.g., a power line and a tree).

specification–in the context of IVM, a document containing detailed, measurable plans and requirements needed for an effective vegetation management program. Must be written by a utility vegetation manager.

stakeholder–a person or group that has a legitimate interest in a project or organization.

strike zone–360-degree area around a tree equal to that tree's height. Constitutes a space upon which a tree could fall if it failed.

subtransmission lines–high-voltage lines generally energized between 69 and 161 kV. They can be as low as 35 kV. Subtransmission lines connect bulk transmission substations to industrial customers or distribution substations.

transmission lines–high voltage lines that are critical to regional electric reliability. They are generally energized between 230 kV and 765 kV, although some transmission lines are energized as low as 69 kV. Transmission lines connect generation and bulk transmission substations.

transmission grid–interconnection of transmission lines used to deliver electricity from power plants to transmission substations or to transfer electricity to other utilities or regions.

tree growth regulator (TGR)–chemical that can be applied to trees that slows terminal growth by reducing cell elongation.

utility vegetation manager–a professional with the proper experience, education, and training to successfully establish or supervise an integrated vegetation management program.

wetland–land where water saturation is the dominant factor determining the nature of soil development and the types of plant and animal communities living in and on the soil.

windrow–in the context of utility vegetation management, slash or debris raked or stacked in a row to the side of a right-of-way. The term evokes a row of hay raked up to dry before being rolled or bailed.

wire zone–section of a utility transmission right-of-way directly under the wires, and extending to a utility specified distance (e.g., 60% of phase spacing; 10 ft or 3 m) on each side. The wire zone is typically managed to sustain a low-growing forb, grass, herb, and shrub plant community.

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About the Author

Randall H. Miller is Director of Vegetation Management at PacifiCorp. He is currently Chair Elect of the TREE Fund Board of Trustees. He has served as President of the Utility Arborist Association, on the Editorial Board of the Journal of *Arboriculture & Urban Forestry*, the International Society of Arboriculture's Certification Test Committee, as Chair of the Edison Electric Institute Vegetation Management Task Force, President of the Oregon Urban and Community Forest Council and as a member of Utah Community Forest Council Board.

He joined PacifiCorp in 1993, and has been their System Forester since 1999. He earned his bachelor's degree in horticulture from the University of Wisconsin-Madison and master's degree in urban forestry from the University of Wisconsin-Stevens Point. He is an ISA Certified Arborist® and an ISA Certified Arborist Utility Specialist™. He received the 2001 ISA Pacific Northwest Chapter Utility Arborist Award, the 2005 ISA R.W. Harris Author's Citation, the 2007 Utility Arborist Association President's Award, the 2007 ISA Pacific Northwest Chapter President's Award, and the 2008 Utah Chapter Distinguished Service Award. He has over 60 arboricultural-related writing credits to date.

Richland County Council Request of Action

Subject:

Motion to Explore all Options for Providing County Assistance with a Public Housing Project

Notes:

At the September 9, 2015 Richland County Council meeting, Mr. Rose brought forth the following motion:

> "Move to have staff explore all options to provide County assistance with an important public housing project. The Columbia Housing Authority (CHA) completed its Choice Neighborhood Plan in August, 2014. HUD awarded the Planning Grant to CHA in 2012 for this project. The CHA plans to demolish Gonzales Gardens (GG) and Allen-Benedict Court (ABC) public housing communities as soon as funding is available. In preparation for losing 520 units, the CHA is currently identifying housing to purchase so GG/ABC residents can be relocated. CHA purchased a 123 units at Village at Rivers Edge. CHA plans to acquire and/or construct an additional 127 units of housing in the near future, but that still leaves the need for 270 more units for relocation purposes."

Staff is working to identify possible funding options pertaining to Mr. Rose's motion. Staff will bring this item to the Committee for their consideration at a future Committee meeting.

Richland County Council Request of Action

Subject:

Comprehensive Youth Program

Notes:

Staff and the Clerk's Office are working in conjunction with the Sheriff's Department, Magistrate's Office, Solicitor's Office and the Alvin S. Glenn Detention Center to develop a plan of action regarding a comprehensive youth program. Once completed, Staff and the Clerk's Office will report this information back to the Committee for their review and action.

Richland County Council Request of Action

Subject:

Request for Easement – Hiller Road

Notes:

At the November D&S Committee meeting, the Committee deferred this item to the December 15, 2015 Committee meeting to allow staff time to address Mr. Malinowski's questions regarding this item. At this time, staff is working to gather additional information to respond to Mr. Malinowski's questions. Once this information is available, staff will bring this item back to the Committee for review and action.