Five Year Vegetation Management Plan

2019-2023

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1: Introduction

The purpose of this Vegetation Management Plan (VMP) is to outline the Fitchburg Gas and Electric Light Company[1] (hereafter referred to as FG&E or the Company) five year plan for managing vegetation in compliance with 333 CMR 11.00 (Appendix 3). The Company's VMP and practices take into consideration not only 333 CMR 11.00 and M.G.L. Chapter 132B, but all applicable state regulations pertinent to the management of utility rights-of-way including but not limited to: all pertinent clauses in Chapter 85 of the Acts of 2000; the Massachusetts Endangered Species Act (MESA; M.G.L. chapter 131A) and its regulations, 321 CMR 10.00; and the Massachusetts Wetland Protection Act (M.G.L. chapter 132A) and its regulations, 310 CMR 10.00 of the Massachusetts Department of Environmental Protection.

The Company manages approximately 350 acres and 30 miles of cross-country transmission rights-of-way and 410 miles of distribution right-of-way, located primarily along roads, through the municipalities of Ashby, Fitchburg, Lunenburg and Townsend.

The cross-country rights-of-way traverse uplands and lowlands typical of central Massachusetts. They traverse wetlands and uplands in three municipalities: Fitchburg, Lunenburg and Townsend. These municipalities are primarily rural and suburban, though portions of Fitchburg are urban.

Taking into account this variety of landscape conditions, the Company applies an Integrated Vegetation Management (IVM) approach to controlling vegetation on its rights-of-way. Vegetation management is necessary to ensure safe, reliable delivery of electric service through the transmission and distribution lines located on our rights-of-way. Tall growing tree species must be prevented from growing into or falling on to the lines. Dense woody vegetation, vines, noxious vegetation and all vegetation that interferes with access must be removed from around structures, access roads and anywhere they prevent access to the right-of-way for inspections, maintenance, repairs and emergency access to the lines.

Integrated Vegetation Management is defined as a system and framework for managing plant communities by which vegetation managers identify compatible and incompatible vegetation, consider action thresholds, evaluate control methods, select and implement controls to achieve specific objectives and monitoring results to provide continuous improvement. The system requires knowledge of the ecosystem being managed and consideration of natural and cultural resources and input from stakeholders. The choice of control methods is based on the anticipated effectiveness, environmental impact, site characteristics, safety, security, economics and other factors (see A.N.S.I. A300, (Part 7) and Miller, 2007). In electric utility

[1] Fitchburg Gas and Electric Light Company is a subsidiary of Unitil Corporation.

vegetation management, the plants to be controlled are primarily tall growing trees that can grow in to or fall on to electric lines. The Company's VMP is based on IVM principles and practices.

2: The Primary Goals and Objectives of the VMP

The primary goal of this VMP is to outline the standard operating procedures for all vegetation management operations on the Company's transmission and distribution rights-of-way. Its purpose is to document the Company's IVM program standards, practices and procedures, which are designed to manage undesirable vegetation on rights-of-way while minimizing the risk of unreasonable adverse effects on human health and the environment.

The VMP is intended to provide a source of information for state and municipal officials and any interested parties regarding the Company's vegetation management program. It also provides guidance for vegetation management workers contracted by the Company to carry-out the vegetation management program.

The following items are objectives that must be taken into consideration as part of the primary goal of the Company's vegetation management program:

- To ensure the reliable delivery of electric service to our customers;
- To utilize an IVM program as the preferred method of vegetation management on the Company's transmission rights-of-way within the regularly scheduled vegetation management work;
- To utilize an IVM approach as a component of a distribution vegetation management program that primarily uses pruning and removal of trees along distribution rights-of-way within the regularly scheduled vegetation management work;
- To maintain an optimum four to five year maintenance cycle for all rights-of-way;
- To ensure that all vegetation management operations are conducted in a safe effective manner in conformity with federal and state laws and A.N.S.I. Z133;
- To treat all Sensitive Areas listed in 333 CMR 11.04 according to regulatory and Company policy as areas that require special consideration during vegetation management operations;
- To follow the procedures in 333 CMR 11.05(4)(d), to maintain the flexibility necessary to accommodate unique situations and the need for more appropriate techniques as they arise in accordance with new regulations, scientific advance, operational experience, and/or comments from municipalities, state agencies, the general public and contractors;
- To have a Company representative respond quickly to any questions or complaints from the public and/or governmental agencies that relate to rights-of-way vegetation management.

3: Rights-of-Way Vegetation and Identification of Target Vegetation

Target vegetation refers to vegetation that is incompatible with intended use of the electric utility facility. More non-target (compatible) vegetation species are present on electric rights-of-way than target (incompatible) vegetation. A successful IVM approach to vegetation management leads to establishment of vegetative communities that are compatible with the electric facility. The low-growing compatible vegetation exerts a biological control on the vegetative community. Plant species that are generally encouraged on the right-of-way include herbaceous growth and shrubs that mature less than 12 feet in height, unless due to their location or attributes they interfere with the function of the right-of-way. As a result, many plant and animal species use rights-of-way. This early successional plant community, however, is not ecologically stable; it will develop as a result of the IVM program the Company plans to implement.

Vegetation that impedes access to the right-of-way and/or grows tall enough to interfere with the electric lines must be removed. Target vegetation, therefore, include trees and limbs, tall growing shrubs, vegetation growing around substations, structures, access roads, gates, and anywhere vegetation impedes access to the right-of-way and equipment.

The primary target plant species are trees, generally defined as woody plants that mature at heights exceeding 12 feet. Trees must be removed or controlled within the cleared right-of-way. Trees along the edge of rights-of-way shall be pruned or removed to prevent interference with the electric facility. Targeted tree species include but are not limited to: maples, oaks, ash, cherries, birches, beech, pines, hemlock and spruces.

Certain non-tree plant species are also targets, some due to their location and others because of their nature. All woody vegetation (trees, shrubs and vines) on or encroaching upon roads or pathways or immediately adjacent to line structures or equipment will be controlled to provide adequate access to structures along the right-of-way. These plant species include but are not limited to: viburnum, mountain laurel, honeysuckles, grape vines, oriental bittersweet, Virginia creeper, etc.

If no permanent access route exists along a right-of-way, a pathway may be created and maintained in a suitable location by controlling all woody vegetation within the selected route. Woody vegetation must be removed in these areas to ensure access to and along the right-of-way and line structures for safe efficient inspection, maintenance and repair operations.

Plant species that present an environmental or safety problem will be controlled whenever practicable. The categories of the plant species that cause safety problems are poisonous vegetation and noxious and nuisance vegetation that has dermal toxicity or heavy thorn growth and may create hazards for people working on or traversing the right-of-way. These also include plants that are invasive.

Poisonous vegetation presents a health hazard to Company personnel, contractors and the general public, which can lead to OSHA recordable incidents for workers. Mechanical control methods do not reduce the presence of these plant populations, particularly poison ivy, therefore the Company plans to use herbicides to spot treat poisonous plants at sites within its rights-of-way.

Noxious and nuisance vegetation present a risk to safety and health of all individuals working on or traversing a right-of-way and can further impede emergency response. These plants have heavy thorns, dense foliage and/or impenetrable stems. Examples include, but are not limited to, federal and Massachusetts classified noxious plants such as Multi-floral Rose, Common and Glossy Buckthorn, Greenbriar and dense populations of grapevines.

Invasive plant species create hazards for the environment. Invasive plants have become an increasing concern in Massachusetts in areas that include right-of-way corridors where they can spread rapidly and then move on to the adjacent landscape. The Massachusetts Invasive Plant Advisory Group defines invasive species as: "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems". They are characterized by their ability to spread rapidly and have spread beyond their original cultivated areas; affected areas are often simultaneously impacted by multiple species. The United States Department of Agriculture maintains a list of invasive plants. Some examples commonly found on rights-of-way include, but are not limited to: Japanese Knotweed, Oriental Bittersweet and Glossy Buckthorn (some of these species are also noxious plants).

To ensure accurate identification of target and non-target vegetation, all vegetation management personnel are required to be familiar with the vegetative species typically present on Company rights-of-way. An excellent reference for plant species is the Northeast Shrub and Short Tree Identification book (see Ballard et. al. 2004).

4: Integrated Vegetation Management Methods

The Company proposes to use all appropriate IVM methods available including: mechanical, chemical, and biological control methods. Mechanical and chemical control methods facilitate development of a low-growing plant community that in time will become the biological control over the plant community. For more information on biological control, see Section 5, page 11.

The primary mechanical methods will be hand cutting with chainsaws, pruning and mowing. Chemical methods involve the use of herbicides applied in several ways including: cut-stump treatment, basal treatment and low-volume foliar treatment. All methods except mowing are applied selectively.

The rate of tree height growth and density of incompatible vegetation will determine the length of the maintenance cycle. In central Massachusetts, other utilities typically employ a five-year maintenance cycle. Timing will likely vary from four to five years depending on results of inspections of re-growth rates of vegetation and density of vegetation.

Historically the Company has only used mechanical methods (mowing and hand cutting). Exclusive use of mechanical methods has resulted in rights-of-way plant communities dominated by hardwood tree species. Hardwood tree species are fast growing and incompatible with electric utility facilities. Conversion to low-growing shrub, grass and forbes plant communities will require multiple cycles of mechanical and chemical treatments. Gradually, the right-of-way plant community will convert to low-growing species, requiring less mechanical and chemical treatment as the low-growing plant community exerts biological control.

While the range of IVM cycle length is likely to be four to five years, the Company will be flexible and avoid fixed schedules. Timing of vegetation maintenance will be based on inspections of rights-of-way. Inspections will include evaluation of incompatible vegetation height and density, compatible species composition, site access and topography. Maintenance of the electric facility may also impact timing of vegetation management work.

The advantage of a flexible IVM program is the ability to apply the appropriate mechanical and chemical methods to meet the conditions of individual rights-of-way. As the sole means to control vegetation, mechanical controls are a short-term solution. With the exception of most conifer species, cut vegetation re-sprouts, resulting in high density in-compatible vegetation. Selective herbicide application methods effectively remove this vegetation that would otherwise compete with and dominate the low-growing, early successional plant communities that provide biological control.

Mechanical methods are the preferred method for non-sprouting conifer species as well as in areas where herbicides are precluded, such as the no-spray areas associated with Sensitive Areas; in visual screens, around structures, on access roads; and where large areas of high density in-compatible species exceed maximum herbicide treatment heights (12 feet). Mechanical methods are applied in combination with chemical methods for hardwoods over 12 feet tall – they are hand cut and stumps treated with herbicide.

Mechanical Methods:

Hand Cutting

Hand cutting is the mechanical cutting of vegetation using chain saws, brush saws, loppers or hand pruners. Hand cutting may be conducted at any time of the year. Target species are cut as close to the ground as practical. Slash from the cutting is cut and scattered so as to lay close to the ground – not to exceed two feet in height.

Hand cutting is used to: protect environmental Sensitive Areas; around structures; gates and access roads; to control vegetation greater than 12 feet in height; where herbicide use is prohibited by regulation or easement restriction; on non-sprouting conifer species; and on sites where terrain, site sensitivity or site size makes mowing impractical.

Mowing

Mowing is the mechanical cutting of vegetation using large tree/brush mowers mounted in rubber tired tractors or tracked vehicles.

Mowing may be used at any time of the year except when deep snow prevents safe operation. Selection of specific equipment is based on terrain, vegetation size and equipment availability. Mowing is restricted by steep slopes, rocky terrain, obstructions, wet sites with deep soft soils and debris on the right-of-way.

Mowing is used on sites where herbicide use is prohibited by regulatory or easement restriction, where vegetation is tall and high density, and where terrain, site size and sensitivity permit the efficient use of the equipment.

Selective Pruning

Selective pruning is the mechanical removal of the tops or limbs of trees to prevent them from growing in to or falling on to the lines.

Selective pruning may be done at any time of the year. Pruning will be accomplished from the ground, using aerial lifts or by tree climbing crews.

This method is used in maintaining trees in visual screens adjacent to yards or roads and along the edges of the rights-of-way to prune off-right-of-way trees.

Slash is the woody debris generated from pruning and cutting operations. Slash will be disposed of by dicing and cutting low to the ground, chipping, piling or removing from the site at the discretion of the Company. The preferred method of disposal is to dice and cut low to the ground and leave to on the right-of-way to decay naturally.

Slash will not be left in waterways, trails or roads, or in such a manner that would permit it to wash into these areas. The placement of slash must comply with applicable State Fire Marshall regulations. Slash from yards or recreational sites will be chipped or removed to an adjacent area or removed. Chipping is used when dicing and cutting low to the ground are prohibited or impractical. Chips will be removed in highly sensitive sites. When left on site, wood chips will be scattered uniformly over the site at depths not exceeding four inches or piled on isolated areas. No chips will be left in wetlands.

Chemical Methods

Herbicide application include cut stump, basal and low volume foliar. Herbicides are applied as mixtures consisting of the herbicide formulation(s), adjuvants, carriers and additives. The timing of herbicide applications, materials and mix rates will be detailed in the Company's Yearly Operational Plan (YOP) and associated notices to municipal officials and newspaper notices. The Company will only use herbicides and mixes consistent with the *Sensitive Area Materials List* published by the Massachusetts Department of Agricultural Resources (DAR). The Company System Arborist will further specify to the contractor, the particular materials and mixture rates for individual rights-of-way according to conditions and timing of the treatments. Treatment crews will not deviate from the Company's specification without the approval of the System Arborist.

Each herbicide has varying degrees of efficacy on vegetation. Seasonal variations in rainfall and date of application also effect efficacy. No herbicide is equally effective on all species and certain herbicides are more effective on some species than others. The Company selects the herbicide or combination of herbicides in conjunction with the appropriate treatment method to obtain the most effective control of the in-compatible vegetation and density on each right-of-way.

Each herbicide and method of application has distinctive results with respect to "brownout" and timing of plant necrosis and environmental characteristics. Environmental characteristics such as rate of biodegradation and mobility in the soil are important to consider when prescribing their use. Some herbicide formulations are labeled for use in wetlands, others are not. The selection of herbicide or herbicide

mixtures and the appropriate application method is made with equal consideration given to the visual and environmental sensitivity of a right-of-way or site within a right-of-way.

The environmental characteristics, rates of application and selectivity of the application method are critical parameters for consideration by the DAR in development of the *Sensitive Area Materials List*.

Methods of Application:

Selective Foliar Application

Selective foliar applications are made to fully developed leaves and stems of the incompatible vegetation. Selective foliar applications are limited to the season when leaves are fully developed, typically from June through early October.

The equipment for selective foliar applications includes hand-pump backpack sprayers, motorized backpack sprayers and off-road vehicle mounted hydraulic sprayers. Applications are made as a uniform spray over the plant's entire foliage to dampen or lightly wet the vegetation, not applied to run-off. This application method minimizes the amount of herbicide applied and reduces impacts to desirable vegetation under and around the incompatible vegetation and deposition to the soil.

Selective foliar applications were shown to result in the least deposition of herbicide to the soil. See Nickerson et. al., 1993.

Selective foliar applications are used on hardwood trees and incompatible shrub species below 12 feet in height. Foliar applications are not used where landowner agreements preclude their use, within visual screens on incompatible species greater than 6 feet in height and within mechanical only sensitive areas per 333 CMR 11.04.

Foliar applications are allowed in wetland areas where no standing water is present, per the Department of Food and Agriculture Decision, dated October, 1995, concerning the wetland impact study conducted pursuant to 333 CMR 11.04(4)(c)(2), see Appendix 4.

Low Volume Basal Application

Low volume basal treatments are the selective application of an herbicide, diluted in specially formulated oil, to wet the lower 12 to 18 inches of the stem of incompatible plants. Application is made using a hand pump backpack sprayer. The oil carrier enables the herbicide solution to penetrate the bark tissue and translocate within the plant.

Low volume basal applications are very selective, and when used in low incompatible species density, are applied at low rates of herbicide per acre. Optimum vegetation density is low, with average heights greater than 4 feet, within visual screens and in areas where a high degree of selectivity is necessary. The application method can be used any time of the year except in conditions that prevent access to the target stems such as seasonal standing water or deep snow. The optimum treatment time frame is in the dormant season when applications are easier due to the lack of foliage and the obstruction caused by grasses and herbaceous growth. Basal applications are not ideal in high incompatible vegetation densities due to the time and cost to apply, the likelihood of missing incompatible vegetation and resulting high level of application of herbicide per acre.

Low volume basal applications are used on the same species and vegetation heights cited above for foliar applications. Basal applications have the advantage of extending the application season into the dormant season. They also have the advantage of not creating brownout of vegetation.

Cut Stump Applications

Cut stump applications are the mechanical cutting of incompatible vegetation followed by herbicide application to the phloem and cambium tissue of the stump. The cut stump mixture is diluted in water or a non-freezing liquid carrier and is ideally applied to freshly cut stumps. Application equipment includes low-volume backpack sprayer, hand pump sprayer, hand held squirt bottles, paintbrushes and sponge applicators.

This application method is used where maximum selectivity is desirable and/or to reduce the visual impact of vegetation management work. It is commonly used to prevent re-sprouts when hand cutting vegetation is preparation for a foliar application, to apply herbicide to vegetation in sensitive sites where other methods are not possible, on all woody vegetation (except conifers) removed in visual screens except within environmentally sensitive areas where restrictions preclude herbicide use.

Like basal applications, cut stump applications may be used at any time of the year provided snow depth does not prevent cutting low to the ground. It is best to avoid application during the season of high sap flow, and/or moderate to heavy rain; it is not practical in moderate to heavy vegetation densities.

Tree Growth Regulators

Tree growth regulators are plant growth regulator chemicals that manage or reduce the potential growth rates of trees. This application is useful where restricted clearance to

electric lines requires repetitive pruning, in high priority areas of electric lines, in difficult to access areas, or where safety is a concern, such as along railroad tracks.

Tree growth regulators can lengthen the time between pruning cycles, improve the aesthetics of street trees requiring severe pruning, and help to positively affect the tree's health. The tree growth regulator treatment creates other plant growth effects that are beneficial for tree health including increased root density, improved drought and heat resistance, and higher tolerance to insects and diseases. See Chaney 2005.

Tree growth regulators can be applied by either basal drench around the base of the tree, or a soil injection next to the buttress root zone.

5: Integrated Vegetation Management and Justification for Herbicide Use

The primary purpose of electric utility rights-of-way is the safe and reliable delivery of electricity to the Company's customers through our transmission and distribution lines. The Company's rights-of-way traverse the heavily forested landscape of central Massachusetts. Reliable delivery requires the Company to maintain vegetation on both cross-country and roadside rights-of-way. This vegetation maintenance must be conducted in compliance with environmental laws and regulations. In Central Massachusetts these regulations are aimed primarily at protecting public shade trees along roads, wetlands, water supplies and endangered species. Effects on human health, both the public and utility workers, are also a goal of federal, state and local laws. The use of herbicides requires compliance with pesticide regulations as well.

Integrated Vegetation Management provides a framework for both compliance with federal and state environmental laws and environmental stewardship - extending beyond compliance. The Company's environmental commitment as stated on its website, *"to take proactive steps to ensure our impact on the area's natural resources is minimized so that its uniqueness is preserved for future generations"*, is consistent with IVM with environmental stewardship. See A.N.S.I. A300 Parts 1 and 7 and Miller 2007. For IVM concepts see: McLoughlin 1997; Ballard and Nowak 2004; Nowak and Ballard 2005; E.P.R.I. 2002 and US EPA 2008.

The Company's IVM program allows us to stay in compliance with reliability requirements by maximizing the control of incompatible vegetation while minimizing the use of herbicides through their selective and judicious use. Integrating use of herbicides with mechanical methods of vegetation management leads to a level of biological control that has been proven to be environmentally sensitive, socially acceptable and economically sound. Biological control is a core requirement of IVM. Concepts of biological control through selective application of herbicides have been demonstrated through research for decades: see Egler 1953; Egler 1958; Carson 1962; Bramble and Byrnes 1983; Neiring and Goodwin 1974; Putz and Canham 1992; VanBossuyt 1987; Yahner 2002; Lentz and Krause 2012.

Decades of research by electric utilities in Massachusetts and across the United States has shown that use of herbicides within an IVM framework are a safe method of vegetation management. See Norris, et.al. 1989; Norris et. al. 2004. Research in Massachusetts has shown that the small amount of herbicide applied selectively at low rates per acre and the herbicide formulations that will be listed in our YOP are low in acute toxicity, do not bioaccumulate and as applied, have a short life span in the environment and very low soil mobility. See Duebert 1985; Nickerson 1992; Nickerson et. al. 1994 and Norris et. al. 1989.

The DAR's process for evaluation and development of the *Sensitive Area Materials List* provides an additional protection tool in Massachusetts. Limiting our methods of application to this list of herbicides helps the Company further reduce the potential of any negative impact by limiting the herbicide formulations used in the limited spray sensitive area areas as defined by 333 CMR 11.04. The DAR process for developing this list includes review by the Department of Environmental Protection and the Department of Health.

333 CMR 11.04(4) also limits the use of herbicides around various surface waters – lakes, ponds, streams and any standing water. However, it makes an exception to the general rule for public utilities by allowing herbicide treatments within wetlands as long as sensitive area approved herbicides are not applied within 10 feet of standing or flowing water. This exception is based on successful completion of a study cited in the DFA Decision Concerning the Wetland Impact Study Conducted Pursuant to 333 CMR 11.04(4)(c)(2). This research study showed that selective herbicide applications do not adversely affect wetland plant composition of function (see Appendix 4). In fact, mechanical vegetation management methods result in a significantly greater negative impact on wetland composition and function. See Nickerson, 1989. Other references showing protection of wetlands, ground water and surface water body buffers include: Environmental Consultants, Inc. 1991; Nickerson et. al. 1994; and Norris 1999.

The high degree of selectivity and control inherent in selective herbicide applications adds further protections. A potential route for public exposure to herbicides is through drift during foliar applications. The Company's vegetation management program eliminates significant drift from foliar applications by requiring the use of low drift agents, prohibiting treatments in high winds and setting maximum vegetation heights for foliar application. Herbicides, particularly when applied selectively by low volume methods, also dry quickly on the plant surface thereby significantly reducing the potential for dermal exposure. Selective herbicide applications further reduce the visual impact of treatments by eliminating extensive foliar brownout or the drastic landscape change caused by less selective herbicide treatment or mechanical methods.

The Company's history of exclusive use of mechanical methods on cross-country rights-of-way will necessitate a multi-cycle conversion process to low-growing plant communities before the full benefit of selective herbicide application benefits are realized. The Company will employ mowing and mechanical vegetation management, followed within a year, by use of herbicide methods, to mitigate and minimize the visual effects of this conversion process. Conversion of the plant community resulting from a transition from mowing to IVM based herbicide application has been demonstrated by Johnstone 1990 and Norris et. al. 1989.

For case studies of other electric utility implementation of IVM and conversion of plant communities, see: Johnstone 1995; Yahner and Hutnik 2004; Ferrandiz 2008 and Money 2008.

Other electric utilities in Massachusetts have used IVM and selective herbicide application for decades. The success of their efforts in minimizing unreasonable adverse effects is evidenced by the lack of herbicide damage complaints received, the lack of enforcement actions by DAR and by the thriving early successional plant communities on their rights-of-way.

Selective herbicide application has been shown to increase plant diversity on rights-of-way in Massachusetts and throughout the United States. See Nickerson and Thibodeau 1984, Norris et. al. 1989. This increase in diversity can only occur if tree species are selectively removed, allowing many species of low growing shrubs, grasses and herbaceous plants to thrive. Herbicides eliminate root systems of the tree species that would survive and dominate the right-of-way environment if the root systems were not controlled. Mechanical methods alone will not eliminate root systems.

Incompatible tree species densities on rights-of-way under an IVM program that includes selective application of herbicides average only 500 to 1,000 stems per acre five years after treatment. In contrast, without herbicide application to eliminate root systems, incompatible species density can average over 20,000 stems per acre on a right-of-way. The low growing plant community has exerted biological control of 95% of the potential stem density if herbicides were not used. See Norris et. al. 1989 and E.P.R.I. 2000. Establishment of a low growing plant community on new rights-of-way is demonstrated by Nickerson et. al. 1989; Haggie et. al. 2008 and Johnstone et. al. 2002.

Selective herbicide applications minimize the amount of manpower, equipment and the impact of both on the environment compared to non-selective mowing or hand cutting operations. For example, when used judisciously, they can be much less destructive that mowing to nesting sites and vegetation necessary for food and cover for birds and other wildlife. The resulting low growing vegetation provides a more open right-of-way with more attractive flowering plants and berries that support an increase in the diversity of wildlife species. Research has shown the right-of-way plant community provides benefits to amphibians: Yahner et. al. 2001; butterfly populations: Bramble et. al. 1989; Sullivan et. al. 2012; bird species: Bramble et. al. 1992; Confer 2000; Confer 2002; Confer et. al. 2008; Marshall et. al 2002; Yahner et. al. 2004; and small mammal populations: Bramble and Byrnes 1992. Other wildlife habitat benefits are shown in Bodin 2011; Ball 2012; Yahner 2002; and Lentz and Krause 2012. IVM benefits to conservation of rare plant species in shown in Walden et. al. 2008. Conservation of vernal pools on rights-of-way is shown in Donohue 2012 and Duncan 2012.

A selective herbicide program is also more cost effective than a purely mechanical program. The comparatively increased density and height of incompatible tree species promoted by mechanical methods requires the expenditure of more time and resources to manage. Estimates based on actual costs by other utilities indicated that average expenditures for a

mechanical program are two to five times the cost of an IVM based herbicide program: see Finch and Shupe 1997; E.P.R.I. 2002 and Nowak 2012.

Mechanical methods are also relatively hazardous to workers, the public and the environment. In a mowing operation, objects including rocks and wood debris are thrown by the mower, often long distances. Chainsaw kick-back causes injuries despite safety features on the saws and protective leg guards. Small diameter cut stumps left by cutting operations may cause trips and falls and damage vehicles on the right-of-way. Mechanical only programs also facilitate the spread of injurious thorny or poisonous plants which results in unsafe conditions for the public, vegetation management crews and electric line crews. Again, due to their re-growth habits, rapid re-sprouting of trees leads to impenetrable growth on the right-of-way.

The use of mechanical equipment always includes the risk of hydraulic fluid, oil and gas spills or leaks, and all mechanical equipment releases petroleum products into the environment in the form of bar and chain lubricants. Use of this type of equipment is a necessary tool, but can be minimized by implementation of an IVM based selective herbicide program. See Norris 1989.

The net environmental benefits of an IVM based approach to vegetation management is linked to establishing low growing vegetation that will exert biological control over re-growth. Not only does reducing the density and inhibiting the growth of incompatible tree species reduce the amount of herbicide needed for control, but low growing plant cover helps prevent soil exposure and erosion that can result from the rutting caused by mowing. Maintenance cycles are lengthened with an IVM based herbicide program and there are fewer incompatible species that require maintenance which reduces both the long and short term ecological impact of vegetation management activities.

In summary: An integrated approach to vegetation management that includes the use of herbicides benefits the environment and is safer to the vegetation management workers and the public that use or live adjacent to the rights-of-way. The compatible plant community does most of the work to control incompatible vegetation. Mechanical methods alone do not result in a sustainable plant community that controls incompatible vegetation. Furthermore, overall worker and public exposure to harmful chemicals is reduced through an integrated approach.

6: Identification and Vegetation Management Methods in Sensitive Areas

For the purposes of this VMP Sensitive Areas regulated by 333 CMR 11.04 are as follows:

Any areas within rights-of-way, including No-Spray and Limited Spray Areas, in which public health, environmental or agricultural concerns warrant special protection to further minimize the risks of unreasonable adverse effects.

Sensitive Areas include the following:

Water Supplies

- Zone I
- Zone II
- IWPA (Interim Wellhead Protection Area
- Class A Surface Water Sources
- Tributaries to a Class A Surface Water Source
- Class B Drinking Water Intakes
- Private Wells

Surface Waters

- Wetlands
- Open Water Bodies
- Rivers
- The Mean Annual High Water Line of a River
- The Outer Boundary of a Riverfront Area
- Certified Vernal Pools

Cultural Sites

- Agricultural Areas
- Inhabited Areas

Wildlife Areas:

- Certified Vernal Pool Habitat
- Priority Habitat

Protecting these environmentally sensitive sites is accomplished by defining specific sensitive areas and establishing limited spray and no spray areas and treatment restrictions within these

areas based on the sensitivity of each site and the requirement to minimize any unreasonable adverse impacts within that area.

These sensitive areas consist of no-spray areas in which herbicide use is prohibited, limited spray areas, and areas that require special treatment recommendations. A table of the no-spray and limited spray areas is presented below.

Sensitive Area Restriction Guide (333 CMR 11.04)

Sensitive Area	No-Spray or Limited Spray Areas (feet)	Control Method	Restrictions
Public Ground Water Supplies	400'	Mechanical Only	None
Primary Recharge Area	Designated buffer area or 1/2 mile radius	Mechanical, Approved Herbicides*	24 months
Public Surface Water Supplies (Class A & Class B)	100'	Mechanical Only	None
	100'-400'	Approved Herbicides	24 months
Tributary to Class A Water Source, within 400' upstream of water source	100'	Mechanical Only	None
	100'-400'	Approved Herbicides	24 months
Tributary to Class A Water Source, greater than 400' upstream of water source	10'	Mechanical Only	None
	10'-200'	Approved Herbicides	24 months
Class B Drinking Water Intake, within 400' upstream of intake	100'	Mechanical Only	None
	100'-200'	Approved Herbicides	24 months
Private Drinking Water Supplies	50'	Mechanical Only	None
	50'-100'	Approved Herbicides	24 months
Surface Waters	10'	Mechanical Only	None
	10'-100'	Approved Herbicides	12 months
Rivers	10' from mean annual high water line	Mechanical Only	None
	10'-200'	Approved Herbicides	12 months
Wetlands	100’ (treatment in wetlands permitted up to 10’ of standing water)*+	Low-pressure Foliar, CST, Basal, Approved Herbicides	12 months
Inhabited Areas	100'	Approved Herbicides	12 months
Active Agricultural Area(Crops, Fruits, Pastures)	100'	Approved Herbicides	12 months
Certified Vernal Pools	10'	Mechanical Only when water is present	None
Certified Vernal Pool Habitat	10'-outer boundary of habitat	No treatment without approval	
Priority Habitat	No treatment without written approval per 321 CMR 10.14(12)		

Restrictions “24 Months”: A minimum of twenty-four months shall elapse between applications

“12 Months”: A minimum of twelve months shall elapse between applications

*Massachusetts Approved herbicides for sensitive sites

[+]Per the *DFA Decision Concerning the Wetlands Impact Study* for utilities per 333 CMR 11.04(4)(c)(2).

Limited spray area limits assume herbicides, mixes, rates and frequency of application meet Sensitive Area limited spray requirements and DFA Decision for herbicide use in wetlands.

The Company uses sensitive area herbicides, mixes, rates and frequency of application requirements on the full length and width of all rights-of-way. Therefore the outer limit of the Limited Spray area does not need to be identified.

7: Operational Guidelines for Applicators of Herbicides

The Company retains independent contractors for all vegetation management work and requires these contractors to comply with all applicable federal and state laws and regulations and the Company vegetation management specifications. Contractor performance with this VMP and appropriate YOP's will be evaluated and enforced by the Company.

Vegetation Management Guidelines

The Company's IVM program will be applied to remove or control all incompatible vegetation within the full width and length of the rights-of-way. The IVM program must result in control or removal of 100% of the incompatible vegetation greater than six feet in height and a minimum of 90% control or removal of all incompatible vegetation less than six feet in height.

With few exceptions, all incompatible vegetation will be controlled or removed in a treatment operation. This includes all woody vegetation and vines growing on or encroaching upon roadways, trails, or on or within ten feet of structures within the cleared width of the right-of-way. Treatments will also extend around the perimeter of substation following all sensitive area restrictions.

The only exceptions are trees in yards and other landscaped areas and trees or shrub species specified by NHESP in the Priority Habitat of state-listed species. All exceptions, however, must be maintained to "at time of vegetation management clearances" specified by the Company.

Environmentally sensitive areas will be treated per 333 CMR 11.04 requirements. Vegetation management operations on these sites are designed to prevent any unreasonable adverse environmental effects. These no-spray and limited spray areas will be maintained using the appropriate control methods.

Conifer species are generally not treated with herbicides since most do not re-sprout after hand cutting. One exception to this general guideline is Pitch Pine, which may be treated with herbicides. This species is rare on the Company rights-of-way.

In cases where large high density incompatible species are present, it may be more practical to do a mechanical treatment followed in one or two growing seasons by an herbicide application. Historically, the Company's rights-of-way have been treated with only mechanical methods, resulting in the presence of dense incompatible vegetation. The conversion process to low-growing plant community will require mechanical treatments to be followed by herbicide treatments.

Right-of-way access will be on established roadways within the right-of-way and from off-right-of-way locations. The contractor will obtain permission to enter a right-of-way by any other means in advance of the work.

Unreasonable site damage or destruction during any phase of the vegetation management work by the contractor, his agents, or employees, must be repaired or mitigated to the satisfaction of the Company; the Company will determine what constitutes unreasonable damage.

General Operational Guidelines

The Company System Arborist will inform the contractor which rights-of-way will be treated, the range of treatment dates and the methods, materials and mixing rates. The Company will supply maps and written instructions outlining any special restriction for each right-of-way. The contractor and the System Arborist will work to identify and mark all sensitive areas as appropriate. No work will be carried out until the contractor has the appropriate data, permits, maps, herbicide mix information, special instructions and sensitive area information unless authorized by the Company.

The Company will carry-out and document all correspondence, meetings and input from municipalities within the forty-five day YOP and twenty-one day municipal right-of-way notification letter review and comment periods and the 48 hour newspaper notification (under 333 CMR 11.06 & 11.07 and Chapter 85 of the Acts of 2000).

The Company will maintain records of treatment methods, rates of herbicide application and treatment results.

The contractor is responsible for providing or adhering to the following:

- Appropriately licensed or certified supervisors who understand all aspects of the contracted treatment and who are responsive to the guidance of the Company;
- Work carried out in compliance with the A.N.S.I. Z133 Safety Standard;
- Supervisors who effectively manage treatment crews to ensure the satisfactory completion of the work;
- Supervisors who effectively communicate with the public;
- Experienced and/or trained workers, who are appropriately licensed or certified;
- Workers who conduct themselves professionally at all times;
- Supervisors and workers who understand the federal and state legal framework applicable to the work;
- All contractors must have a copy of this VMP;

- All treatment crews must have copies of the YOP and municipal notification letters on-site at all times;
- All treatment crews must carry Company right-of-way maps;
- Comply with all applicable federal and state laws and regulations;
- Utilize appropriate equipment to maintain the highest practical efficiency and effectiveness;
- Calibrate herbicide application equipment will be appropriately;
- Maintain equipment in good visual and working condition.

Vegetation management operations must be conducted according to the VMP, appropriate YOP, contractual terms and conditions and the written instruction of the Company. Failure to do so is grounds for removal of the treatment crew from the property and termination of the vegetation management contract.

Herbicide Application Restrictions and Guidelines

Herbicide application will be restricted during certain adverse weather conditions, such as rain, wind or deep snow.

Rain
Herbicide applications will not be made during periods of moderate or heavy rain fall:
- Foliar applications are effective in light mist

- Foliar applications will cease during measurable rainfall that creates leaf runoff will wash the herbicide off the target

- Foliar applications interrupted by unexpected rainfall, will not resume until the rain ends and active leaf runoff has ceased

- Basal and cut stump treatment applications are ineffective during measurable rainfall

- Basal applications that are interrupted by rainfall will not be resumed until at least fifty percent of the application zone of the target species is dry.

Wind
Wind affects the individual herbicide treatment methods on different levels:
- Basal or cut stump treatments are not affected by all but the most extreme wind conditions because they are applied in such close proximity to the ground.

- During foliar applications, excessive winds can cause damage to desirable vegetation on or off the right-of-way, therefore, to prevent any significant off target drift of herbicides, treatment crews will comply with the following restrictions:

- During periods of winds strong enough to bend the tops of the main stems of trees on the right-of-way, the treatment crew supervisor will periodically observe the foliar

application to ensure that there is no significant movement of the herbicide mixture. If the supervisor can see the mixture moving off the targets, applications will immediately stop until the wind has subsided enough to permit further applications

- All foliar application mixtures will contain anti-drift agents to reduce the potential of herbicide drift beyond target vegetation:
    - Added to the foliar herbicide mixture per the anti-drift agent label

In moderate wind conditions, as per label recommendations, more anti-drift agents may be added to control significant drift, at the discretion of the contractor supervisor.

Deep Snow

Herbicides will not be applied in deep snow conditions. Deep snow creates logistical impediments for basal and cut stump treatments. Deep snow renders it impractical to basally apply herbicides to the lower six inches of the stem of the targets or to cut target stumps below acceptable maximum height limit.

General Operational Guideline Restrictions

- *Disposal* : The contractor is responsible for the proper disposal of all excess materials and mixtures in accordance with all applicable Federal and State laws, regulations and guidelines.

- *Mixing:* Mixing will take place according to all restrictions in 333 CMR 11.00 and according to the chemical labels.

8: Identification and Qualification of Individuals Preparing and Submitting this VMP and Supervision of the IVM Program

Overall supervision for development and implementation of the VMP will be performed by:

Sara Sankowich
System Arborist
Fitchburg Gas and Electric Light Company
357 Electric Ave
Lunenburg, MA 01462-2246

The Company System Arborist is ultimately responsible for preparation, implementation of and compliance with this VMP and YOP's to be submitted annually. The System Arborist's duties include: work scheduling, prescription of herbicides and application methods, procurement of necessary permits, municipal notifications, contractor selection, provision of technical expertise and liaison between Company right-of-way easement landowners, neighbors, local and state officials and other interested parties and field supervision of vegetation management contractors.

Sara Sankowich has 18 years of experience in electric utility vegetation management, a degree in Forestry and is an International Society of Arboriculture Certified Arborist.

This VMP was drafted by Sara Sankowich in consultation with Thomas E. Sullivan from Energy Initiatives Group, LLC. Tom Sullivan has worked in the electric utility vegetation management business for over thirty years. He formerly managed the Transmission Forestry Department and VMP's and YOP's for National Grid. He has degrees in Forestry and Biology and is a Massachusetts Licensed Forester and International Society of Arboriculture Certified Arborist.

9: Description of Alternative Land Uses of Rights-of-Way

Alternate land uses of the right-of-way constitute a cultural control method in the context of an IVM program. Alternate uses include but are not limited to: agricultural use such as crops, pasture, orchards, nurseries and tree farms; maintained landscaped areas such as yards, lawns, parks, golf courses and other recreation areas; and paved areas such as roads and parking lots.

The Company rights-of-way are primarily located on easements. The underlying private or public owner retains the right to use the land for other purposes. The easement specifies use of the right-of-way for construction and maintenance of electric facilities, access to the facilities and vegetation maintenance. Alternative uses of the land must conform to the terms of the easement.

The Company rights-of-way are primarily surrounded by forested lands. There are areas with agricultural uses, landscaped areas and paved areas. Compatible alternate uses are encouraged by the Company. Areas with maintained alternative use do not require maintenance and cost to the Company.

The Company encourages compatible alternative use on the rights-of-way by land owners. An agreement with the Company is required. Interested landowners can apply by sending a request to forestry@unitil.com. Activity cannot include structures and must permit emergency access and maintenance by the Company. All requests are reviewed by the System Arborist. Each applicant shall be contacted and an effort made to come to a suitable agreement.

10: Remedial Spill and Emergency Plan

This section is offered as a general procedural guide for responding to chemical spills or related accidents (related accidents include but are not limited to fire, poisoning and vehicle accidents). The Company contracts with independent, professional, certified herbicide applicators that are responsible for the containment, clean up and reporting of chemical spills or accidents. The following is, therefore, only a guide to the information sources that ***shall be*** available to the treatment crew in the event of a chemical spill or emergency situation:

TYPES OF CHEMICAL SPILLS THAT REQUIRE ACTION

Chemicals include, but are not limited to the following:

- Herbicides
- Bar and Chain Oil
- Motor & Hydraulic Oil
- Diesel Fuel
- Gasoline
- Title 3 Hazmat Materials

REQUIRED SPILL RESPONSE EQUIPMENT

As a minimum, the ROW crew shall have available on the job site:

- VMP and YOP with emergency contact lists
- MSDS and product labels
- Product Fact Sheets
- Appropriate absorbent material such as “speedi dri” or “soak up”
- Shovel
- Broom
- Flagging
- Leak proof container
- Heavy-duty plastic bags

PERSONAL CONTACT

In the event of **Personal Contact** with hazardous chemicals:

- Wash affected area with plenty of soap and water
- Change clothing which has absorbed hazardous chemicals
- If necessary, contact a physician
- If necessary, contact the proper emergency services

- If necessary, follow the procedures for Major or Minor Spills as outlined below
- Avoid breathing the fumes of hazardous chemicals

REFERENCE TABLES (INFORMATION SUBJECT TO CHANGE AS NECESSARY)

Table 1: Herbicide Manufacturers

MANUFACTURER	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
BASF Corporation	800-832-4357	Arsenal
E.I. du Pont de Nemours and Company	800-441-3637	Krenite & Escort
Dow Agro Sciences	800-992-5994	Accord & Garlon
Rainbow Treecare Scientific Advancements	800-888-8372	Cambistat

Table 2: State Agencies

STATE AGENCY	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Massachusetts Pesticide Bureau	617-626-1700	A.S.A.P (within 48 hours)
Massachusetts Department of Environmental Protection, Emergency Response Section	Main Office: 888-304-1133 Central Region: 508-792-7650	for emergencies involving reportable quantities of hazardous materials; required info: City/town, Street address, Site name (if applicable), material
Massachusetts Poison Information Centers	800-222-1222	for medical emergencies involving suspected or known pesticide poisoning symptoms

Table 3: Emergency Services

EMERGENCY SERVICE	TELEPHONE NUMBER
Massachusetts State Police, Central Office	617-566-4500 or 911
ChemTrec	800-424-9300

Fitchburg Gas and Electric's contact in the case of a spill or accident:

The FG&E Central Dispatch telephone listed below.

603-294-5102

Table 4: Local Emergency Numbers
(to be filled out with the appropriate towns and included in the YOPs)

Municipality	Emergency Services	Board of Health	Town Hall
	911		

CLEAN-UP PROCEDURES

Education and attention will constantly be directed at accident and spill prevention, however, the following is a guideline in the even the event of a spill:

REPORTABLE SPILLS (Spills of reportable quantity of material): FOLLOW STEPS 1 – 11

NON-REPORTABLE SPILLS: FOLLOW STEPS 1, 2, 3, 4, 8, 9, 10 & 11 and contact the Company representative.

Table 5: HERBICIDE SPILL CHECK LIST

Order	ACTION		Done (v)
1	Use any and all PPE as directed by product label or MSDS.		
2	Cordon-off spill area to unauthorized people and traffic to reduce the spread and exposure of the spill.		
3	Identify source of spill and apply corrective action, if possible stop or limit any additional amounts of spilled product.		
4	Contain spill and confine the spread by damming or diking with soil, clay or other absorbent materials.		
5	Report spills of "reportable quantity" to the Massachusetts DEP and DAR: See 310 CMR 40.00		
	Massachusetts DAR, Pesticide Bureau	617-626-1700	
	Massachusetts Department of Environmental Protection, Emergency Response Section	Main Office: 888-304-1133 Central Region: 508-792-7650	
6	If the spill cannot be contained or cleaned-up properly, or if there is a threat of contamination to any bodies of water, immediately contact any of the following applicable emergency response personnel:		
	local fire, police, rescue	911	
	FG&E: Central Dispatch	603-294-5102	
	FG&E: Environmental Dept: Tom Murphy	603-379-3829	
	FG&E: Forestry: Sara Sankowich	603-379-3833	
	Chemtrec	800-424-9300	
	additional emergency personnel		
	If there is a doubt as to who should be notified, contact State Police, Central Office	617-566-4500 or 911	
7	Remain at the scene to provide information and assistance to responding emergency clean-up crews.		
8	Refer to the various sources of information relative to handling and clean-up of spilled product.		
9	If possible, complete the process of "soaking up" with absorbent materials.		
10	Sweep or shovel contaminated products and soil into leak proof containers for proper disposal at approved location.		
11	Spread activated charcoal over spill area to inactivate any residual herbicide.		

Appendices

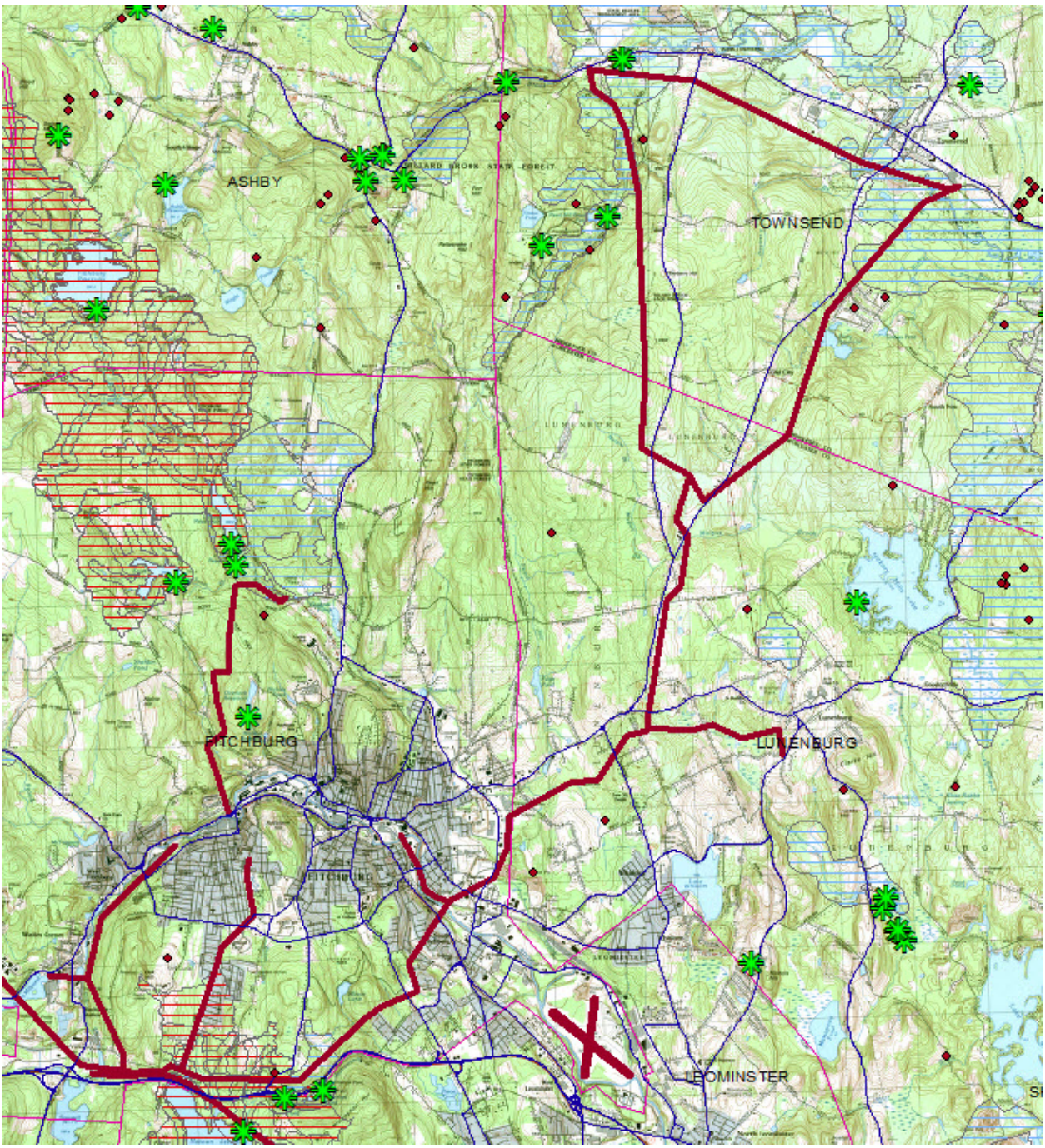
Appendix 1:

Description of Right-of-Way Segments

Fitchburg Gas and Electric Light Company Right-of-Way Segments				
Line Number	Voltage	Description	Miles	Acres
1 & 2	69 kV	Flagg Pond Substation #4 to Summer Street Substation #40	4.18	50.7
1 Tap & 3	69 kV	Flagg Pond Substation #4 to River Street Substation #25	2.68	32.5
1& 3 Taps	69 kV	Taps to Princeton Road Substation #50	0.18	2.2
1 & 2 Taps	69 kV	Shea Street Taps to Beech Street Substation #1	2.23	27.0
4	69 kV	Summer Street Substation #40 to Sawyer Passway Sta. #22	0.56	6.8
8 & 9	69 kV	Summer Street Substation #40 to Townsend Junction	5.47	66.3
8	69 kV	Townsend Junction to Townsend Substation #15	3.31	40.1
9	69 kV	Townsend Junction to West Townsend Substation #39	3.19	38.7
10	69 kV	Townsend Substation #15 to West Townsend Substation #39	3.3	40.0
8 & 9 Taps	69 kV	Taps to Lunenburg Substation #30	1.25	15.2
F30W30	13.8 kV	Lunenburg Substation #30 to West Street	0.25	3.0
1341	13.8 kV	Wallace Street Substation #21 to Rindge Road #35	2.5	30.3
		Total:	29.1	352.7

Appendix 2:

Locus Map of Fitchburg Gas and Electric Light Company Territory and Rights-of-Way



Appendix 3:

333 CMR 11.00 Rights-of-Way Regulations

https://www.mass.gov/files/documents/2018/04/18/333cmr11.pdf

Appendix 4:

Department of Food and Agriculture Wetland Decision

Appendix 5

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