



CITY OF LOWELL



FIVE YEAR VEGETATION MANAGEMENT PLAN

2015-2019

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1. INTRODUCTION

The purpose of this Vegetation Management Plan (VMP) is to establish a five-year plan to control vegetation along roads, highways and trails (“public ways”) in the City of Lowell in compliance with 333 CMR 11.00 Rights of Way Management (See Appendix 1). This VMP implements an Integrated Vegetation Management (IVM) program that considers and employs all methods of vegetation control. Herbicides will be utilized where safety, effective target vegetation control or environmental concerns indicate the appropriateness of the choice. Lowell’s VMP also takes into account all applicable laws and regulations that regulate the management of public ways.

Incorporated in 1824, the City of Lowell has a total area of 14.5 square miles and over 100,000 residents. As the first large manufacturing center in the United States, Lowell is a mixture of urban, educational, suburban and historic/recreational sites with a dense population. Lowell’s vegetation management program takes place within this highly populated landscape.



Figure 1: Lowell

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2. GENERAL STATEMENT OF GOALS AND OBJECTIVES

Vegetation management along public ways is necessary to control unwanted vegetation that poses a public nuisance and creates traffic and pedestrian hazards. The operational goal of this VMP is to ensure vegetation management practices along public ways are conducted in an effective and environmentally sound manner.

To accomplish this primary goal, Lowell is instituting an Integrated Vegetation Management (IVM) program that adheres to the parameters set in 333 CMR 11.00. This will be accomplished by following an adaptation of the American National Standards Institute (ANSI)/International Society of Arboriculture (ISA) definition of IVM which in business terms is actually a structured decision management model used to map out the decisions involved in developing, using and monitoring an IVM program.¹

This model is based on an article by Christopher A. Nowak and Benjamin D Ballard. It includes six steps set in a continuous cycle of re-examination of each step. The following is a list of these six steps as they related to the schema of this VMP:

- Step 1:** “Understanding Pest and Ecosystem Dynamics” (Section 3)
- Step 2:** “Set Management Objectives and Tolerance Levels” (Sections 2, 5, 6, 8 & 10)
- Step 3:** “Compiling Treatment Options” (Sections 5 & 6)
- Step 4:** “Account for Economic and Environmental Effects of Treatment” (Sections 2, 7 & 8, budgetary objectives and objective of 333 CMR 11.00)
- Step 5:** “Site Specific Implementation of Treatments” (Sections 3, 4, 5, 6, 7, 8 & 9)
- Step 6:** “Adaptive Management and Monitoring”² (Sections 4 & 5).

While this VMP adheres to decision making processes above, the individual objects of this VMP are:

- To maintain safe public ways;
- To ensure that all vegetation management operations are conducted in a safe, effective regulatory compliant manner;
- To work towards achieving a long term, low maintenance vegetation management program
- To allow for unplanned tasks for which all precautions are taken to utilize the correct treatment methods;
- To use appropriately certified, licensed and qualified vegetation management crews;
- To have a Department of Public Works (DPW) representative available to respond quickly to any questions or complaints from the public and/or government agencies;
- To perform an annual review to assess treatment and cost effectiveness, environmental effects, public safety and regulatory compliance,

¹ ISA and ANSI.

²Christopher A. Nowak and Benjamin D. Ballard, “A Framework for Applying Integrated Vegetation Management on Rights-of-Way,” *Journal of Arboriculture* 31(1): Jan 2005. Step 3 could theoretically be mechanical only, which is not IVM. Step 4: 333 CMR11.01: “...minimize the uses of, and potential impacts from herbicides... while allowing for the benefits to public safety...”

- To maintain the flexibility necessary to accommodate unique situations and the need for more appropriate techniques as they arise within the regulatory framework of 333 CMR 11.00 (in accordance with new regulations and/or scientific advances).

In the end, the purpose of this VMP is to provide a basic source of information for state and municipal officials, and other interested parties. It will also provide technical guidance to the qualified and appropriately licensed and certified individuals who will physically carry out the vegetation management treatment program.

3. IDENTIFICATION OF TARGET VEGETATION

Target Vegetation:

Vegetation that poses a public nuisance and/or poses a risk to pedestrian or vehicle safety.

The first step in any IVM program is the identification of incompatible target plant species and why they are targets. Overall, target vegetation along public ways is vegetation that poses a public nuisance and/or poses a safety risk to pedestrian or vehicular safety and that interferes with the safe movement of goods and services through the public right-of-way.

Vegetation Posing a Risk to Safety

Vegetation that hampers visibility or impedes movement along public ways poses a risk to public safety. M.G.L. Chapter 87, Section 5 authorizes tree wardens to have control of “all public shade trees, shrubs, and growths” along public ways. This includes woody plant species, grass and herbaceous plant species and public nuisance vegetation as listed below. For example, any vegetation such as grape vines or tree branches that might obscure street signs.

Public Nuisance Vegetation

Public nuisance vegetation includes, but is not limited to plant species growing along public ways that pose a health, safety or environmental hazard. Noxious vegetation (weeds)³, which includes poisonous and invasive plants, poses a risk to safety and health because of heavy thorns, dense foliage and/or impenetrable stems; examples include, but are not limited to, Multiflora Rose, Common and Glossy Buckthorn, Japanese Knotweed, Blackberries, Barberry and Autumn Olive. Although not the only poisonous target species of concern, Poison Ivy comprises the overwhelming majority of poisonous plant communities along public ways that require control.

Nuisance Grass and Herbaceous Growth

In most instances, grass is a desirable plant species. Along the shoulders of roads, grass growth is often encouraged and maintained through mechanical mowing. However, in some instances, grasses and other herbaceous plants are targets in areas where they cause a safety risk. These areas include, but are not limited to, cracks in asphalt, along guardrails, within paved traffic islands, medians, on and between sidewalks and the adjacent curbing. Herbaceous and other broadleaf vegetation can also harm the stability of grassy areas by out-competing the desirable grass species.

³ “NOXIOUS WEED.—The term “noxious weed” means any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.” (PUBLIC LAW 106–224—JUNE 20, 2000, TITLE IV—PLANT PROTECTION ACT).

4. PUBLIC WAY INTEGRATED VEGETATION MANAGEMENT

This program is designed to follow the *Purpose* of 333 CMR 11.00: “to establish a statewide and uniform regulatory process which will minimize the uses of, and potential impacts from herbicides in rights-of-way on human health and the environment while allowing for the benefits to public safety provided by the selective use of herbicides.”⁴ The four components of this IVM program are cultural, physical, mechanical, and chemical techniques applied to control target vegetation in an ecologically sound manner (see Figure 1).

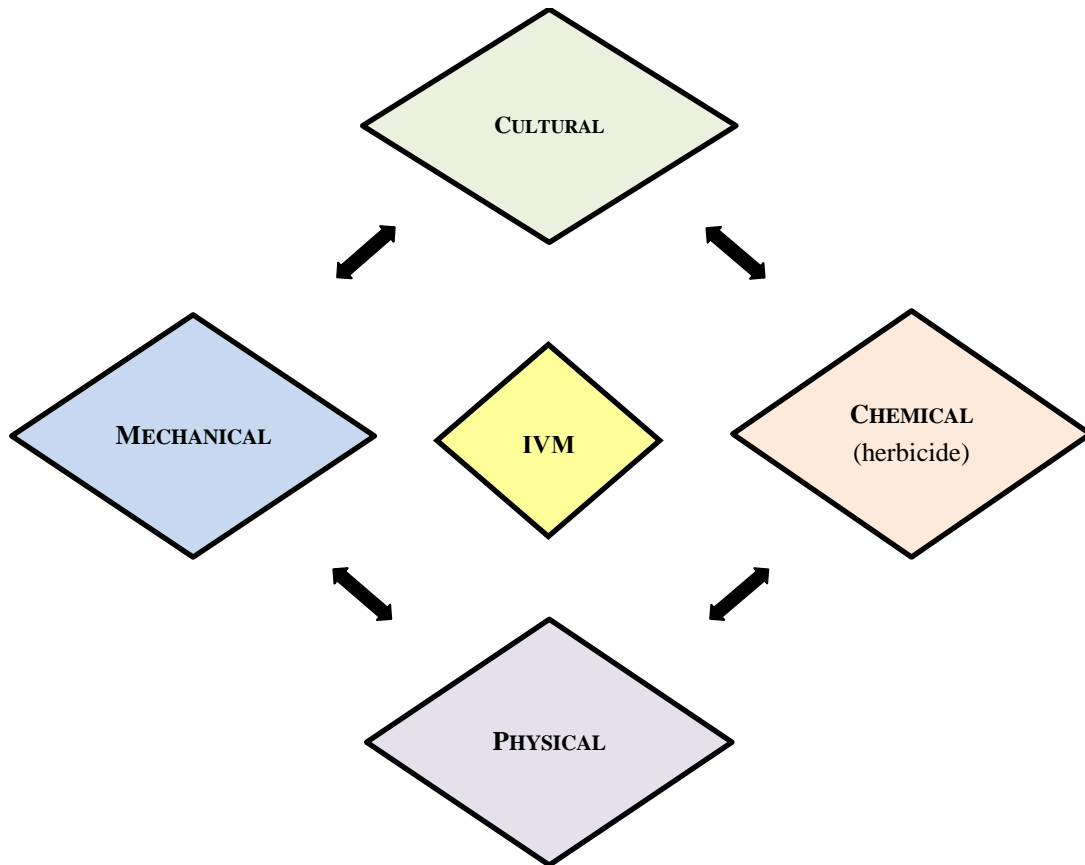


Figure 2: Public Way Integrated Vegetation Management

The cultural component includes the structure decision model defined by Nowak and Ballard, but it is more than this management framework, it is a combination of monitoring, record keeping, plantings and understanding how the landscape is used for economic, agricultural, social and recreational purposes. According to the Merriam-Webster Dictionary the term “Culture” has six meanings, most of which apply to IVM, and the term “Cultural” is defined as: “of or relating to culture or culturing.”

The original meaning of “Cultural/Culture” is to cultivate as in agriculture. In this capacity, this term has been expanded to the sciences to include “cultivating living material.”

⁴333 CMR 11.00 *Right of Way Management*: Section 1.

These two definitions apply to IVM in its goal to encourage plant species that are compatible with Lowell's vegetation management goals; i.e. right plants for right places. For this IVM program in a highly populated landscape, "culturing" primarily is planting and/or maintaining compatible vegetation and removing target plant species.

In Lowell's IVM program, however, often the amount of vegetation that may be tolerated at treatment sites is none (cracks in sidewalks, medians, etc.). This moves us towards another definition of "Cultural": human knowledge as applied to society (everyday life) and material culture (stuff); i.e. human interactions within and to daily life and the built environment. We use and alter the landscape for economic, agricultural, social and recreational purposes. What this means for an IVM program is recognizing and managing instances in which landscape uses prescribe the IVM techniques. Effective control methods are adapted or limited to suit the management situation.

For example, residential landscaping may remove the need to manage roadside vegetation, but vegetation may still obstruct signs and guide rails. Street trees may still need to be trimmed or removed when they become a hazard. Conversely, planting desirable vegetation may help limit the opportunity for the establishment of incompatible vegetation.

The role of open/recreational space is critical to residents as it offers opportunities for outdoor recreation, influences quality of life indicators, and helps foster a strong overall sense of community. Taking this cultural use of the landscape into account, noxious, invasive or poisonous plants adjacent to trails and other public ways will generally be controlled by using the most appropriate chemical control methods. As the safest and most effective control method in this instance, applying chemical controls to plants species such as poison ivy minimizes potentially harmful encounters at bus stops, bike paths, historic walking trails, etc.

To continue the use of the Merriam-Webster definitions: "Cultural" includes aesthetic sensibilities. Municipalities need to remove vegetation for safety but there is also an aesthetic value to these treatments. For example, while weeds growing in sidewalks hold a significant potential for causing trips or falls and on a larger scale damage infrastructure through their root systems, this is not the only reason to maintain sidewalks and other paved areas. Adventitious vegetation growth (i.e. unplanted/unplanned) is not part of the aesthetic design of sidewalks in a city whose economy depends on tourism and higher education institutions. To fulfill the requirements of 333 CMR 11.01(2), this plan must improve the cultural value of the sites being treated while taking into account cultural beliefs about the treatment methods: "...taking into account the economic, social and environmental costs and benefits of the use of any pesticide."

IVM, when applied through careful management informed by constant re-education and assessment, built within an industry standard framework, protects the integrity of the program. The final Merriam-Webster definition directly applicable to IVM is: "Business Culture" or "...the set of shared attitudes, values, goals, and practices that characterizes an institution or organization." In other words, the cultural components of IVM are managed through a system of monitoring and record keeping in order to apply the correct treatment methods to the correct sites and, as necessary, to potentially alter the treatments as the conditions at the various sites

require/change over the years and to maintain the flexibility necessary to accommodate unique situations and the need for more appropriate techniques as the industry changes.

Moving to what the Merriam-Webster defines as the opposite of culture as a form of knowledge, “vocational and technical skill[s],” the physical control components of this IVM program are the general maintenance tasks that help prevent the establishment of vegetation. These include, sealing cracks, general right-of-way repairs (i.e. repaving, installing new sidewalk, etc.), using ground cover where appropriate, cleaning ditches and sweeping streets (see Section 5).

The mechanical control components of this IVM program will be discussed in detail in Sections 5, 6 & 7, but in brief, they include mowing, selective pruning and hand cutting to remove or reduce noxious or hazardous vegetation. For example, applying the decision making part of an IVM program to the use of mechanical controls, in many locations the targets are grass and herbaceous plants growing along the edge of the road with no man-made obstructions (e.g. guiderail, curbs) therefore, it may effectively be controlled by the use of mowers, trimmers or other mechanical means.

The chemical control component of this IVM program is the use of herbicides to control incompatible vegetation that cannot be controlled by either physical or mechanical methods alone (see Sections 5 & 6). When appropriate, herbicide use will be minimized by timing applications to maximize control, by avoiding fixed application schedules and by using the most selective methods practical on a site-by-site basis. The main chemical controls are cut stump and foliar treatments which may include pre-emergent herbicides. Two additional treatment methods that Lowell might utilize, in limited situations, are basal and plant growth regulators/broadleaf weed control treatments. These would primarily be considered for areas such as—but not limited to—embankments or around obstructions that are difficult to mow and are therefore being colonized by target vegetation including invasive, noxious and poisonous plant species.

In summary, the benefit of IVM is the ability to choose the most appropriate treatment method or combination of methods for each situation. This is only possible by using the cultural component of IVM in the process of deciding the direct methods of physical, mechanical and chemical treatment methods. This is achieved through careful monitoring, landscape awareness, education, experience and record keeping.

5. IVM PROTOCOL

Taking into consideration all four components of Public Way IVM, the protocol for implementing the IVM program is as follows:

Monitoring: All public ways will be surveyed prior to any scheduled treatment program. Monitoring will be conducted by foot or by vehicle. Monitoring of areas may also result from public requests. Monitoring is a year round protocol.

Maintenance: Roads will be cleaned using a street sweeper. Cracks in the asphalt and sidewalks and other defects will be repaired. Where appropriate, the use of ground cover will be encouraged to assist in the prevention of incompatible target vegetation.

Direct Control Methods: The decision to use one or a combination of IVM techniques will take into consideration the cultural uses of the landscape. The direct IVM management tactics selected will control nuisance vegetation in the most environmentally responsible and efficient manner:

A. Physical Controls

1. Sealing cracks
2. General right-of-way repairs
3. Use of ground cover where appropriate
4. Cleaning ditches
5. Street sweeping

B. Mechanical Controls

1. Hand Cutting
2. Mowing
3. Selective Pruning

C. Chemical Controls

1. Foliar applications
2. Pre-emergent applications
3. Cut stump treatments
4. Basal applications
5. Plant growth regulators/broadleaf weed control applications.

Record Keeping: A log of surveyed areas will be kept for future planning and reference purposes. Areas maintained either through physical repair, mechanical or chemical control will be recorded by the DPW for at least 3 years.

6. VEGETATION MANAGEMENT CONTROL METHODS AND RATIONALE FOR USE

The following section is a description of the direct vegetation management control methods involved in the mechanical and chemical components of Lowell's IVM program. The mechanical and chemical method(s) chosen for a given vegetation problem are based on achieving a long term, low maintenance vegetation management program.

Mechanical Methods:

1. **Hand Cutting:** cutting target species using hand saws, chain saws and brush saws. Target species are cut as close to the ground as practical: the ideal stump height is three inches or less (when possible). Hand cutting is used to remove hazard trees and to protect environmentally sensitive sites including sites where herbicide use is prohibited by regulation including the removal of target vegetation greater than twelve feet tall. Hand cutting is also used on sites where terrain, target species size or sensitivity renders mowing impossible or impractical. Hand cutting may be used at any time of the year.
2. **Mowing:** the mechanical cutting of target vegetation using machines including push mowers, riding-mowers, offset flail mowers, brush mowers, edgers and/or trimmers. Equipment selection is based on site, terrain, and target vegetation size. Mowing is used in most areas where terrain and target stem size permit efficient use of the equipment and in areas where herbicide use is prohibited by regulation. Mowing is the principle vegetation control measure on the shoulders of roads and grassy islands. Mowing may be used at any time of the year except when deep snow precludes operations.
3. **Selective Pruning:** the mechanical pruning of the tops or encroaching limbs of tall vegetation which may cause a hazard or hamper access. The equipment includes aerial lifts mounted on trucks or tractors or, if terrain or obstructions prevent equipment access, climbing crews. Selective pruning may be done at any time of the year and may provide a viable alternative to the removal of vegetation.

Chemical (Herbicide Applications) Methods

1. **Foliar Treatments:** the selective application of herbicides diluted in water, to the foliage of target vegetation. Two types of equipment for foliar treatments are used: back pack and vehicle mounted; both use low pressure at the nozzle per 333 CMR 11.02. Foliar applications take place when leaves are fully developed in the spring until early fall and the beginning of leaf abscission—i.e., when leaves begin dropping.
 - a. **Back pack sprayers:** hand pump or motorized back pack sprayers or squirt bottles. This technique is excellent for spot treatments, such as localized poison ivy infestations. It is not as effective as other methods on high density target vegetation.
 - b. **Vehicle mounted sprayers** use truck, tractor and/or ATV mounted equipment that delivers the herbicide solution through nozzles attached to a hose or boom-

mounted apparatus. This technique is used along roadways that have good access and where obstructions, terrain or site sensitivity do not exclude the equipment.

2. **Pre-emergent Treatments:** the use of pre-emergent herbicides using the same equipment described in the foliar treatments above. Pre-emergent applications are used where season long vegetation control requires “vegetation-free conditions” such as along curbing, sidewalks, under guiderails/guardrails and on paved traffic islands. This method is used from the early spring to early fall.
3. **Cut Stump Treatment (CST):** the mechanical cutting of target species followed by an herbicide treatment to the phloem and cambium tissue of the stumps. CST treatments prevent re-sprouts, thereby reducing the need to re-treat the same vegetation. The CST mixture is diluted in water, basal oil or a non-freezing agent and is ideally made to freshly cut stumps. Application equipment includes low-volume, backpack sprayers, hand held squirt bottles, paintbrushes, or sponge applicators. This method is used where maximum control is desirable; to reduce the visual impact of vegetation management treatments, and/or to reduce the potential of adverse impacts to desirable vegetation because of its selectivity. CST may be used at any time of the year provided snow depths do not prevent cutting the stumps below three inches in height. It is best to avoid during the season of high sap flow, or in moderate to heavy rains. It is not practical in moderate to heavy stem densities.
4. **Low Volume Basal Treatment:** the selective application of an herbicide, diluted in specially formulated oil, to wet the entire lower twelve to eighteen inches of the main stem of target plants. Using a hand pump backpack, the oil enables the herbicide solution to penetrate the bark tissue and translocate within the plant. Low volume basal treatments are extremely selective and used when vegetation density is low and in areas where extreme selectivity is necessary. For public way treatments it is primarily an option for invasive species control. It can be used any time of year except when snow is too deep, in extremely wet weather and/or during spring sap flow.
5. **Plant Growth Regulators/Broadleaf Control (PGR):** the selective application of herbicides to slow down the growth of grasses and remove broadleaf plant species. The principal use of this treatment is to control broadleaf plant species— many of which are invasive or nuisance plants—where they are out-competing desirable grasses despite regular mowing on sites such as road side embankments. PGR treatments control target broadleaf species without damaging desirable grass species. They are used in the same time frame as foliar treatments, using the same types of equipment.

Final Note: Anti-drift Adjuvants are added to the mix or solution in foliage, pre-emergent and PGR applications to help reduce the potential exposure to non-target organisms, reduce the break-up of sprays into fine droplets and increase selectivity and herbicide deposition onto target plants.

7. JUSTIFICATION OF HERBICIDE USE AND SUMMARY OF CONTROL STRATEGIES

By following the IVM protocol listed in Section 6, physical and mechanical treatment methods control many plants that interfere with traffic, visibility and safety. Chemical controls are, however, necessary in management situations where topography, access, growth rate, certain species-specific factors, applicator safety, or environmental/social concerns limit the potential for control by physical or mechanical methods.

Chemical controls are often the preferred method or only method of control for plants that pose a health hazard for the technician in the field, either directly or as a function of location. Poison ivy, for example, is extremely hazardous to handle, biologically resistant to mechanical removal and can pose a serious threat to anyone who inhales the smoke if it is burned. Likewise, attempting to control curbside plants and weeds by pulling them or trimming them can put a technician in danger from traffic and is ineffective for long term control.

Mowing will control most grasses. Herbicide applications, however, are used where mechanical control is not feasible due to location, stem density and/or height. Although grass is more often a desirable vegetative cover along public ways, in areas where it is a target, it is both difficult and sometime dangerous to remove by mechanical treatment methods. These areas include, but are not limited to, cracks in asphalt, along guardrails, paved traffic islands and sidewalks and curbing. In these instances, grass can be identified as target vegetation.

Herbicide applications are the ideal treatment method to control nuisance vegetation. Once established, noxious and invasive vegetation are notoriously difficult to control. While maintaining public ways by mowing can help control noxious vegetation by preventing its establishment, once established, hand-cutting noxious vegetation is less effective and more of a risk to the applicator than the use of herbicides. Invasive vegetation is difficult to remove by its nature. For example, Japanese Knotweed propagates by flowering and underground by rhizomes. Herbicides are the most effective way to stop its spread since even digging up and removing the soil both spreads the plant and does not guarantee its removal from the site.

Additionally, poisonous plant species, such as poison ivy, are best controlled by herbicides. Poison ivy, due to its growth patterns—low when young, tall vines when mature—and the fact that it grows along stolons and reproduces both by fine and fibrous rhizomes as well as by berry, is nearly impossible to control through cultivation, hand pulling or mowing at the height generally used in roadside mowing operations. These climbing vines grow over stone walls, tree trunks and guardrails, making mechanical control out of the question for safety and economic reasons. In some locations, the judicious use of herbicides may also help develop herbaceous communities that out-compete poison ivy.

Woody vegetation over twelve feet in height interfering with pedestrian or vehicle safety can be controlled by a variety of techniques. Pruning or ground cutting using hand tools or chainsaws primarily controls large woody vegetation. The stumps of woody vegetation can be physically removed, depending upon the species of plant and its proximity to other vegetation, but these stumps may also be treated with an herbicide (CST) to prevent re-sprouting.

Small woody plants, under twelve feet in height growing along the road shoulder in an accessible location will usually be mowed or cut and possibly CST'ed. However, low volume foliar applications may be applied where woody plants or vines grow over obstacles, impede the mowers, can't be hand cut and chipped, are resistant to control by mechanical means or where the target vegetation grows very rapidly.

Taking all of these factors into consideration, the following table is a reference for control strategies organized by target plant species types (the restrictions listed in Section 8 apply to all control strategies).

Table 1: Summary of Control Strategies

Target	Method	Details	Restrictions
Nuisance/Noxious Vegetation	Foliar	Spot treatment using back pack method in most cases, unless extremely thick or where grasses and herbaceous growth are also being treated in which case may use vehicle mounted method	Sensitive Areas: no-chemical sensitive areas; limit spray Sensitive Areas unless using approved herbicides
Grasses & Herbaceous Growth	Mowing		Topography; obstructions; density of growth
	Foliar	Spot treatment or in locations where infrastructure may be damaged by adventitious growth (cracks in sidewalks, medians, etc.)	Where mowing is more practical; in no-spray Sensitive Areas
	Pre-Emergent	Where season long vegetation control is necessary and/or practical	Where mowing is more practical; in no-spray Sensitive Areas
Broadleaf Vegetation in Grassy Areas	PGR	To limit grass growth and control broad leaf vegetation in grassy areas without damaging the desirable grass species	Sensitive Areas: no-chemical sensitive areas; limit spray Sensitive Areas unless using approved herbicides

Low Growing Woody Vegetation	Mowing	In no-spray Sensitive Areas	Topography; obstructions; density of growth
	Foliar	Same as grasses and herbaceous growth; rapid resprouting species; invasive plant species	Sensitive Areas: no-chemical sensitive areas; limit spray Sensitive Areas unless using approved herbicides
	Hand Cutting	Where terrain prevents mowing; where re-sprouting is not a concern; in no-spray Sensitive Areas	Where the safety of the operator is a factor
	CST	Where re-sprouting is a concern	Same as hand cutting; in no-spray Sensitive Areas
	Basal	Where stem densities make hand cutting impractical; for invasive species	Same as hand cutting; in no-spray Sensitive Areas
Tall Growing Woody Vegetation	Selective Trimming	Where visibility or interference issues do not warrant removal; option for Sensitive Areas	Where removal is warranted; where operator safety issues limit access to the tree
	Foliar	Same as grasses and herbaceous growth; rapid resprouting species; invasive plant species	Vegetation over twelve (12) feet tall; Where mowing is practical, in no-spray Sensitive Areas; limit spray Sensitive Areas unless using approved herbicides
	Hand Cutting	Where terrain or stump diameter prevents mowing; where re-sprouting is not a concern; in no-spray Sensitive Areas	Where the safety of the operator is a factor
	CST	On species over twelve feet tall that are capable of re-sprouting	Same as hand cutting; in no-spray Sensitive Areas
	Basal	Where stem densities make hand cutting impractical; for invasive species	Species over twelve (12) feet tall; same as hand cutting; in no-spray Sensitive Areas

8. DEFINITION, IDENTIFICATION AND TREATMENT OF SENSITIVE AREAS

The definition of Sensitive Areas regulated by 333 CMR 11.04 is 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 risks of unreasonable adverse effects.

Protecting these environmentally Sensitive Areas is accomplished by defining specific Sensitive Areas and establishing treatment restrictions within these borders based on the relative sensitivity of each site and the requirement to minimize any unreasonable adverse impacts within that area.

Sensitive Areas regulated by 333 CMR 11.00 include the following:

Water Supplies:

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

Surface Waters:

- Wetlands
- Water Over Wetlands
- 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.

These Sensitive Areas consist of no-spray areas in which herbicide use is prohibited, and larger, limited spray areas where herbicide use is permitted under certain conditions. Treatment in the limited spray areas require the use of herbicides from the *Sensitive Area Materials List*

available at: <http://www.mass.gov/eea/agencies/agr/pesticides/rights-of-way-sensitive-area-materials-list.html> and following the application restrictions in 333 CMR 11.04, including applications at no more than the minimum labeled herbicide application rate for the control of target species. The general characteristics of herbicides included on the *Sensitive Area Materials List* are: low toxicity to humans and other animal species; short term soil persistence; biodegradation of active ingredients, and low mobility. The specific herbicide formulations and mixtures to be used in any given year will be listed in the Yearly Operational Plan (YOP). The manufacturers' labels and Herbicide Fact Sheets approved by the Department of Agricultural Resources will be included in the appendices of the YOP.

TABLE 1: CONTROL STRATEGIES FOR SENSITIVE AREAS

Sensitive Area	Limited Spray or No-Spray Areas (feet)	Control Method	Time Limits Between Treatment(s)
Public Ground Water Supplies	400'	Mechanical Only	None
Primary Recharge Area	Designated buffer zone 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	10'	Mechanical Only	None
	100' or with approved Wetlands Determination 10'-100' [per 310 CMR 0.05(3)(a) & 310 CMR 0.03(6)(b)]	Low-pressure Foliar, CST, Basal, Approved Herbicides	24 months
Inhabited Areas	100'	Approved Herbicides	12 months
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 outside the 4 foot paved road exemption without approval of the Natural Heritage Endangered Species Program (NHESP)		

*Massachusetts Approved herbicides for sensitive sites

Identification Methods

Two simple descriptions guide the complex identification of the Sensitive Areas defined in 333 CMR 11.04: *Readily identifiable in the field* and *Not readily identifiable in the field*. Readily identifiable in the field areas will be treated, identified and when appropriate, marked according to all applicable restrictions listed in 333 CMR 11.00. Not readily identifiable in the field areas will likewise marked and treated when appropriate, but they are identified by the use of data marked on maps and collected in the YOP and notification processes before the time of treatment.

The individuals assigned the task of identifying and treating Sensitive Areas in the field will use the appropriate sources and methods from the following list:

- Town maps, records and institutional knowledge.
- Massachusetts Department of Environmental Protection water supply maps and/or GIS (Geographic Information Systems) mapping layers available through MassGIS (<http://www.mass.gov/mgis/>).
- Water Department, DAR, and Lowell Board of Health information and identified private wells along the ROW.
- Correspondence, meetings and input—from the chief elected official, board of health, conservation commission, public water suppliers and the public—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).
- A “point person” who verifies, identifies and, where appropriate, marks Sensitive Areas and any additional areas that may require special precautions.
- USGS topographical maps.
- Information from MassGIS.
- When necessary, confidential information from NHESP.
- A copy of the YOP and VMP.

The YOPs will contain maps with the most current data available at the time of printing. The maps are a resource and a tool for both the public and the applicators; therefore, they contain the data needed to identify, mark and treat Sensitive Areas appropriately.

Some Sensitive Areas are contained on the base USGS topographic maps such as applicable *wetland resource areas* defined in Massachusetts Department of Environmental Protection regulations (rivers, wetlands, etc.); the most current data available through MassGIS such as public water supplies and certified vernal pools, and any municipal and private data on items such as private wells. At the time of treatment, *additional Sensitive Area information* that is collected through the review and notification processes (333 CMR 11.06-11.07) will be added to the information utilized by the applicators.

As appropriate, Sensitive Areas will be identified and marked in the field by trained and experienced individuals.

Priority Habitat of State-Listed Species

321 CMR 10.14(8) Massachusetts Endangered Species Act Regulations, Part II, exempts road maintenance from the permit process under the following condition:

[321 CMR 10.14(8)] the maintenance, repair or replacement, but not widening, of existing paved roads, shoulder repair that does not exceed four feet from an existing travel lane, paved driveways, and paved parking areas, but not including parking areas on barrier beaches, coastal beaches, coastal dunes, or salt marshes, as defined by the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40 and 310 CMR 10.00), and not including actions that are likely to result in changes in storm water drainage....

If Lowell needs to treat areas along paved road ways outside of the 4 foot limit or spot treat poison ivy along paths in known Priority Habitats, a copy of the YOP will be sent for approval to the NHESP of the Massachusetts Division of Fisheries and Wildlife.

9. OPERATIONAL GUIDELINES RELATIVE TO HERBICIDE USE

Regulatory Guidelines

- Follow the restrictions of all applicable state and federal regulations.
- Follow the guidelines in this VMP and the YOP's.
- Pesticide applicators must hold a valid pesticide certification or license from the Department of Agricultural Resources.
- Pesticide applicators will keep the appropriate records according to state and federal regulations that at a minimum include:
 - o Date, name and address of vegetation management contractor(s);
 - o Identification of site or work area;
 - o List of crew members;
 - o Type of equipment and hours used, both mechanical and chemical;
 - o Method of application and description of target vegetation;
 - o Amount, concentration, product name of herbicide(s), adjuvants and dilutants (EPA registration numbers must be on file);
 - o Weather conditions;
 - o Notation of any unusual conditions or incidents, including public inquiries.
- The applications must be supervised by a certified applicator.
- Foliar treatments will not be made to target vegetation that exceeds twelve feet in height.

Rain

- No herbicide applications will be conducted during periods of moderate or heavy rainfall.
- Foliar and pre-emergent applications are effective in light mist, however measurable rainfall that creates leaf runoff will wash the herbicide off target vegetation, therefore, if foliar and pre-emergent applications are interrupted by unexpected rainfall, the treatment will not resume until the rain ends and active leaf runoff ceases.
- No PGR applications during precipitation events.
- No CST or basal applications during measurable precipitation events.
- CST or basal applications interrupted by measurable rainfall will not resume until precipitation has ceased.

Wind

Excessive wind can create drift during foliar, pre-emergent and PGR applications and significant herbicide drift can cause damage to desirable vegetation on or off the public ways. CST and basal applications, on the other hand, are much less affected by wind because they are applied in such a close proximity to the ground.

To minimize off-target drift, during foliar, pre-emergent and PGR applications, the applicator will comply with the following restrictions:

- During periods of wind strong enough to bend the tops of the main stems of trees on the public ways, the applicator will periodically observe the application to prevent significant

movement of the herbicide. The application will stop immediately if the applicator can see the herbicide moving off target, until the wind subsides enough to permit further applications.

- All herbicide mixes will contain drift-retardant agents per the drift retardant agent label. In moderate wind conditions, as per label recommendations, more drift retardant may be added, at the discretion of the applicator, to control herbicide drift.

Equipment Calibration

- At a minimum, foliar, pre-emergent and PGR application equipment will be calibrated at the beginning of the season, and in accordance with manufacturer's recommendations.
- Foliar application equipment will be calibrated to maintain pressures not exceeding sixty psi at the nozzle.
- Cut stump treatment squirt bottle applicators or hand pump sprayers will be adjusted to deliver the herbicide solution to the target zone.

General Guidelines

- All mixing and loading of herbicides will be conducted at the DPW's or contractors central facility.
- Mix only the estimated amount of herbicide necessary to carry out the vegetation control, based on monitoring results to ensure that there will be no waste and minimize potential problems.
- The vehicles carrying the spray operations will be equipped with appropriate spill kits including a bag of adsorbent material, activated charcoal, leak-proof containers, a broom and a shovel in case of minor spills.
- A clipboard log of the herbicides on the vehicle will be kept on the vehicle.
- Herbicide labels, fact sheets, the VMP, current YOP and *Herbicide Spill Check List* (Appendix 5) will be on-site.

10. ALTERNATIVE LAND USE PROVISIONS

At this time, Lowell does not offer Alternative Land Use provisions. Since the treatment areas are located either in downtown or suburban neighborhoods, there is no need for alternative land use provisions. For example, a common practice of abutters to roadways is to mow and maintain road shoulders. In this instance, the monitoring program would reveal that the area does not warrant vegetation control.

11. REMEDIAL PLAN TO ADDRESS SPILLS AND RELATED ACCIDENTS

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 following is, therefore, a guide to the items that will be available to the applicator on site in the event of a chemical spill or emergency.

Although education and attention will constantly be directed at accident and spill prevention, in the event of a spill, immediate action will be taken to contain the spill and protect the spill area (Appendix 5: *Herbicide Spill Check List* shall be available on-site to the applicator). Until clean, the spill area will be protected by placing barriers, flagging or crew members at strategic locations, as appropriate. If a fire is involved, care will be taken to avoid breathing fumes from any burning chemicals.

Minor spills will be remedied by soaking up the spill with adsorption clay or other adsorptive material and placed in leak proof containers, removed from the site and disposed of properly. Dry herbicides will be swept up or shoveled up directly into leak proof containers for proper disposal. When applicable, all contaminated soil will be placed in leak proof containers, removed from the site and disposed of properly. When applicable, activated charcoal will be incorporated into the soil at the spill location at a rate of several pounds per thousand square feet to inactivate any herbicide residue. Reportable spills will be reported to the DAR Pesticide Division.

The Massachusetts Department of Environmental Protection will be contacted when there is a spill of a reportable quantity, regardless of major or minor spill status and in accordance with 310 CMR 40.0000, Massachusetts Contingency Plan.

Types of Chemical Spills that Require Action

Chemicals include, but are not limited to the following:

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

Required Spill Response Equipment

As a minimum, the treatment crew will have available on the job site:

- YOP with Emergency Contact List
- MSDS (Material Safety Data Sheet)
- Product Label
- Product Fact Sheets (when applicable)
- Appropriate adsorbent material
- 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 in Appendix 5
- Avoid breathing the fumes of hazardous chemicals

Reference Tables (information subject to change as necessary)

Table 3: Herbicide Manufacturers

MANUFACTURER	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
BASF Corporation	(800) 832-4357	
Bayer Environmental Science	(800) 334-7577	
Dow Agro Sciences	(800) 992-5994	
Monsanto	(314) 694-4000	
NuFarm	(877) 325-1840	Medical Emergencies
PBI Gordon Corporation	(816) 421-4070	

Table 4: State Agencies

STATE AGENCY	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
DAR 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 Northeast Region: (978) 694-3200	For emergencies involving reportable quantities of hazardous materials, call within 2 hours. Required info: City/town, Street address, Site name (if applicable), material, quantity released, environment impacted
Massachusetts Poison Information Centers	800-682-9211	for medical emergencies involving suspected or known pesticide poisoning symptoms

Table 5: Emergency Services:

EMERGENCY SERVICE	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Lowell Fire/ Police Department	911	
Massachusetts State Police, Andover Barracks	(978) 475-3800	
ChemTrec	(800) 424-9300	
Clean Harbors	(800) OIL-TANK	
Pesticide Hotline	(800) 858-7378	PST: 6:30 am-4:30 pm, web: www.NPIC.orst.edu

City of Lowell contact(s) in the case of a spill or accident:

Ralph G. Snow, P.E. | *Public Works Commissioner*
Department of Public Works
The City of Lowell
1365 Middlesex Street | Lowell, MA 01851
t: (978) 674-4111 | f: (978) 970-4071

12: THE QUALIFICATIONS OF THE INDIVIDUALS THAT SUPERVISED, DEVELOPED, AND WROTE THE VMP

A. Individual Managing the VMP

Ralph G. Snow, P.E.
Public Works Commissioner
Department of Public Works
The City of Lowell
1365 Middlesex Street | Lowell, MA 01851
t: (978) 674-4111 | f: (978) 970-4071

Mr. Snow has served as Commissioner of Public Works for the city of Lowell, Massachusetts since November of 2010 after working in various capacities with a local environmental, construction and design consultant for four years. Prior to that, Mr. Snow served as an officer in the United States Navy's Civil Engineer Corps, retiring in 2006 as a captain after almost 24 years of military service. During his navy career he served at various locations around the world in a variety of leadership positions in facilities maintenance, repair and construction including public works director positions at naval facilities in Scotland, Jacksonville, FL and Kittery, ME.

Mr. Snow is a registered professional civil engineer in the states of Massachusetts, New Hampshire and California. He has a BS in Chemical Engineering from Tufts University in Medford, MA; an MS in Environmental Engineering from the University of Texas in Austin, TX; and an MBA from Webster University in St Louis, MO. He also completed an advanced management program at Duke University's Fuqua School of Business in Durham, NC.

B. Individual who wrote and developed the VMP

Wendy L. Priestley, Ph.D.
Co-CEO, Vegetation Management Consultant
Vegetation Control Service, Inc.
2342 Main Street
Athol, Massachusetts 01331

Dr. Priestley's qualifications extend from her education to work experience in the field of herbicide application, crew management and VMP consulting:

Dr. Priestley holds a Ph.D. in American Civilization from The George Washington University, Washington, DC. In this capacity her research, analytical and organizational skill have aided her efforts in writing Vegetation Management Plans.

She has worked both part time and full time since 1985 for Vegetation Control Service, Inc., a consulting and service company that provides vegetation management programs for utilities, government agencies, municipalities, private business and landowners throughout New England.

In this capacity, she is a certified pesticide applicator and her experience includes both field and administrative experience in rights-of-way and industrial weed control programs. Since 1985, she has written or co-authored a number of Vegetation Management Plans for utilities and municipalities both in Massachusetts and throughout New England.

APPENDICES

APPENDIX 1	333 CMR 11.00, RIGHTS-OF-WAY REGULATIONS
APPENDIX 2	CHAPTER 132B
APPENDIX 3	CHAPTER 85, SECTION 10
APPENDIX 4	TREATMENT NOTIFICATION PROCESS PER 333 CMR 11.06-11.07
APPENDIX 5	HERBICIDE SPILL CHECK LIST

APPENDIX 5: HERBICIDE SPILL CHECK LIST

REPORTABLE SPILLS (Spills of reportable quantity of material): FOLLOW STEPS 1-11
NON-REPORTABLE SPILLS: FOLLOW STEPS 1-4, 7-11 as appropriate & contact the Lowell DPW representative.

HERBICIDE SPILL CHECK LIST

Order	ACTION	Done (√)
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 Mass. DEP and DAR:	
	Massachusetts DAR, Pesticide Bureau	(617) 626-1700
	Massachusetts Department of Environmental Protection Emergency Response Section	Northeast Region: (978) 694-3200
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
	Lowell DPW: Ralph G. Snow, P.E.	(978) 674-4111
	Product Manufactures	
	1. BASF Corporation	(800) 832-4357
	2. Dow Agro Sciences	(800) 992-5994
	3. E.I du Pont de Nemours & Company	(800) 441-3637
	4. Monsanto	(314) 694-4000
	5. Nufarm	(877) 325-1840
	Chemtrec	(800) 424-9300
	additional emergency personnel	
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 cleanup 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	