

VEGETATION MANAGEMENT PLAN

JANUARY 1, 2026 - DECEMBER 31, 2030

PREPARED BY:



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I. RAILROAD COVERED BY THIS PLAN

Commuter Rail, Massachusetts Bay Transportation Authority (MBTA)

This Vegetation Management Plan (VMP) was prepared by Benesch and is submitted on behalf of the MBTA Commuter Rail Operator, Keolis Commuter Services, LLC (Keolis). Keolis (Railroad Company), is implementing this Vegetation Management Plan (VMP) for the period of years 2026-2030. The Municipalities subject to be informed of this Plan may be found in Appendix A.

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The Commuter Rail consists of a highly complex transportation network of ~700 miles of track, ~5,126 acres of rights-of-way property, and eleven active rail lines that transport over a million passengers every year from Greater Boston throughout 173 cities and towns within the Commonwealth of Massachusetts as shown on the Commuter Rail System Map (Appendix B). In the past several years, an increase in natural hazards, slippery rail and other conditions have become a growing concern. In prioritizing safety, infrastructure maintenance, protection of assets, and reliability of operations, the Commonwealth of Massachusetts, the MBTA and Keolis have invested significant capital funds and resources to implement the Vegetation Management Plan integrated approach focusing on a combination of mechanical and chemical methods to manage and eradicate the potential vegetation along the rights-of-way (ROW). Vegetation management is critical to the safety of our employees, passengers, and community, and to ensuring the reliability of service and operations in support of the economic growth, prosperity, and general interests of the Commonwealth of Massachusetts.

II. INTRODUCTION

This Vegetation Management Plan shall apply to the Commuter Rail Rights-of-Way maintenance activities within the Commonwealth of Massachusetts in compliance with 333 CMR 11.00, *Rights of Way Management* regulations (Appendix C). The VMP provides the necessary information and general procedures to guide municipalities, interested citizens, railroad employees, and contractors about the VMP for the years 2026-2030.

Vegetation management practices of today have more advanced methods and techniques compared to the non-selective broadcast spraying methods used in the past. These advances are the results of research and the commitment of the railroad companies to adopt an integrated approach to vegetation control. Since 2015, Keolis, with the support of MBTA, has developed a comprehensive and sustainable vegetation management plan that incorporates both mechanical and chemical methods to treat vegetation along the ROW with the objective of improving safety and reducing hazards.

Vegetation growth patterns along Keolis' ROWs are monitored for the identification of priority areas for mechanical vegetation controls and stump treatments. Best management practices (Appendix F) have been incorporated to vegetation control on an annual basis to reduce chemical application by collaborating with the engineering maintenance teams to avoid herbicide application in areas where vegetation control is accomplished as a secondary benefit of ROW operational activities.

This VMP outlines the railroad's 5-year program and operational practices and addresses the major components of the vegetation management including the rationale for the various techniques, the buffering and protection of sensitive areas, the application of an Integrated Vegetation Management approach, and gives an overview of the railroad ROW system. Appendices include a list of municipalities affected by the Plan, the Rights-of-Way Management Regulations 333 CMR 11.00, the Preface to the Wetlands Protection Regulations 310 CMR 10.00 relative to rights-of-way management, the most recent list of herbicides approved by Massachusetts Department of Agricultural Resources

(MDAR) for use on sensitive areas of railroad ROWs, subject to revision, and Best Management Practices.

III. GENERAL STATEMENT OF GOALS AND OBJECTIVES

As outlined in section IV, Keolis has a regulatory obligation to provide a safe and reliable delivery of service. The goal of the VMP is to eliminate vegetation along the ROW that represents “any real or potential condition that can cause injury, illness, or death; damage to or loss of the facilities, equipment, rolling stock, or infrastructure of a public transportation system; or damage to the environment [49 CFR 673.5]” and thereby ensure operations are managed to meet the Safety requirements of the Federal Railroad Administration (FRA).

The primary purposes of this Vegetation Management Plan are to manage and eradicate vegetation, eliminate and reduce the risk of unreasonable adverse effects on human health and the environment, protect the safety of people making public passage on, performing work on, or living adjacent to the ROW, and the safe delivery of transport of goods.

One of the specific goals of the Rights of Way Management Program is to “Ensure that an Integrated Pest Management (IPM) approach to vegetation management is utilized on all rights-of-way covered by 333 CMR 11.00.” The American National Standards Institute (ANSI, A300 Part 7) defines IPM as an IVM. As such, this VMP includes guidelines and procedures to eradicate and manage vegetation that impacts or potentially impacts the ROW through the execution of an IVM approach in order to:

- Maintain the railroad ROW clear from vegetation that interferes with safe operations and federally required inspections.
- Ensure safe and reliable transport of passengers and goods.
- Protect railroad asset's reliability and resiliency.
- Maintain clear lines of sight to protect employees, passengers, and neighboring communities.

IV. VEGETATION MANAGEMENT REGULATORY FRAMEWORK

In railroad transport, safety is the foundation of operations. The following Federal enabling acts exist to ensure that the railroad industry safety of operations is enforced:

• 49 USC § 10501	Interstate Commerce, <i>Railroad Safety</i>
• 49 USC § 20106	National Uniformity of Regulation for “Railroad Safety and Security”
• 49 CFR § 213	FRA Track Safety Standards
• 45 CFR § Parts 659; 674 FTA	Rail Fixed Guideway Systems; State Safety Oversight

Further, the Federal Railroad Administration (FRA), Department of Transportation (DOT) regulations specifically address railroad safety and ROW Vegetation Management in 49 C.F.R. §213.37, which states: *Vegetation on railroad property which is on or immediately adjacent to the roadbed shall be controlled so that it does not:*

- (a) Become a fire hazard to track-carrying structures;
- (b) Obstruct visibility of railroad signs and signals:
 - (1) Along the right-of-way, and
 - (2) At highway-rail crossings;
- (c) Interfere with railroad employees performing normal trackside duties;
- (d) Prevent proper functioning of signal and communication lines; or
- (e) Prevent railroad employees from visually inspecting moving equipment from their normal duty stations.

The Massachusetts Department of Food and Agriculture (DFA), predecessor to the current MDAR, initiated a Generic Environmental Impact Report (GEIR) evaluating alternatives for rights of way management. A technical advisory task force of environmentalists, agencies and rights of way managers assisted in the GEIR preparation and, based on results of the study, recommended to the Secretary of Environmental Affairs a framework for a **coherent state-wide rights of way regulatory program**. DFA published draft regulations to implement this program in 1986 and received extensive public commentary. The Rights of Way Management Program under the jurisdiction of the DFA [333 CMR 11.00] became effective on July 10, 1987.

During the review period, MassDEP worked closely with DFA to include provisions which give maximum protection for water supplies and provide protection for wetlands under M.G.L. c. 131, § 40 and 310 CMR 10.00. Specifically, the Rights-of-Way Management Program regulations presume that work performed in accordance with a VMP and Yearly Operational Plan (YOP), as may be required under 333 CMR 11.00 regulations, *will not alter an area subject to protection under M.G.L. c. 131, § 40.*

To that end, the purpose of the Rights of Way Management regulation is, “*...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. Specific goals of 333 CMR 11.00 are to:*

- (1) *Ensure that an Integrated Pest Management (IPM) approach to vegetation management is utilized on all rights-of-way covered by 333 CMR 11.00.*
- (2) *Establish standards, requirements, and procedures necessary to prevent unreasonable risks to humans or the environment, taking into account the economic, social and environmental costs and benefits of the use of any pesticide.*
- (3) *Ensure ample opportunity for public and municipal agency input on potential impacts of herbicide application to rights-of-way in environmentally sensitive areas.*
- (4) *Establish a mechanism for public and municipal review of rights-of-way maintenance plans.”*

V. VEGETATION ON RAILROAD RIGHTS OF WAY

V.1 GENERAL OVERVIEW OF RAILROAD RIGHTS OF WAY

The FRA enforces standards for the safety of railroad operations across the nation to ensure consistency across carriers. In Massachusetts, there are over 700 miles of tracks that serve freight and passenger service. The freight railroads carry a constant flow of raw material and finished products into, out of, and through the Commonwealth of Massachusetts. Railroads also provide commuter rail service and high-speed inter-city passenger service on some of these routes. Major track segments have few alternate or duplicate routes and cannot be closed easily or for long periods of time for vegetation maintenance without major service disruptions. Vegetation maintenance must be scheduled around the normal schedule of rail traffic and detailed planning and scheduling is required to accomplish vegetation maintenance activities within a narrow time window.

The railroad ROWs are unique in that they are owned by the various railroad corporations and are constructed and operated in accordance with Federal and State laws and standards for the specific purpose of rail transportation. Railroad ROWs are similar to other ROWs however, railroad companies own their ROWs in fee, whereas electric and pipeline companies usually obtain easements which convey only specific use rights to the easement holder. The railroad ROW connects railroad facilities and can be divided into several distinct areas. Each of these areas have different uses and activities and different requirements for vegetation management all ultimately aligned to safe operations.

To understand the complexities of the railroad ROW and how unmanaged vegetation can interfere with the operations of the railroad system, this VMP provides descriptions and illustrations of the specific areas along the railroad ROW. Knowledge of the role and function of each area along the ROW is necessary to assess and understand the vegetation management practice used in those areas.

An additional complication with railroad ROW vegetation management is that it is restricted to established route schedules which requires work-around logistics of railroad traffic. Work execution depends on a variety of critical maintenance activities that might restrict the use of either chemical and or mechanical vegetation control activities. The complexities of railroad ROW vegetation management include:

- Transportation on railroad tracks is continuous until terminal points with little flexibility to avoid impact or interruptions of operations and there are no alternative tracks to divert rail traffic.
- The railroad network of tracks is shared with multiple freight and passenger carriers with different schedule requirements of logistics and dispatch centers.
- Planning chemical and mechanical applications require coordination between multiple rail carriers and

dispatch controls which creates a dynamic and everchanging system of operation priorities that limit the planning and execution of the vegetation program.

- Construction projects and outages create challenges for general ROW maintenance activities including vegetation management.
- Railroad ROW and property lines vary between cities and towns.

The railroad is a complex transportation network system composed of infrastructure that fundamentally makes up the foundation of rail operations and includes all assets that have a: *"demonstrable relationship to the function and operation of a railroad or rail transit system*, including but not limited to: rails and tracks, ties, ballast, rail beds, signal and communication systems, switches, overhead catenary systems, signage, traction power substations, passenger stations/depots and associated infrastructure and utilities, freight transfer facilities, boarding areas and platforms, boarding platform shelters and canopies, bridges, culverts, tunnels, ancillary facilities, ventilation structures, equipment maintenance and storage facilities, railyards, parking lots and structures, landscaping, passenger walkways, and security and safety fencing."¹

Federal laws require control of vegetation, most specifically, *all* vegetation must be eliminated from the following areas:

- Ballast section (Roadway)
- Ballast shoulder (Roadway)
- Yards (Roadway/ Facilities)
- Switches, signals, and signs (Roadway assets/infrastructure)
- Highway grade crossings
- Bridges, bridge abutments, and buildings
- Off-track areas
- Inside of curves

The railroad roadway consists of roadbed, ditches, shoulders and adjacent ROW assets that support operations within railroad property lines. The typical roadway infrastructure consists of rail tracks (superstructure) supported by a roadbed (substructure) built with ties (treated wood or concrete) over ballast on a graded and compacted earthwork section. The substructure is designed to support the track structure and traffic load. The earthwork section typically slopes downward to drainage ditches on each side of the roadbed. The entire roadbed and adjacent area (ditches and shoulders of the roadway) are designed to carry water away from the tracks.

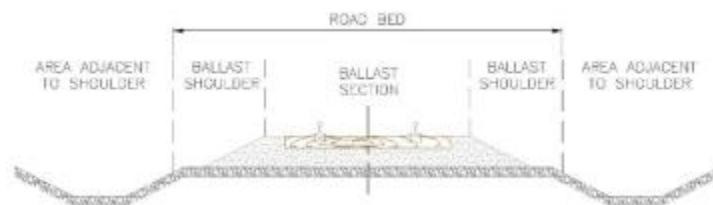


FIGURE 1
TYPICAL RAILROAD BED AND SHOULDERS

V.2 VEGETATION IMPACTS ON RAILROAD ROW

Vegetation control is one of the most important safety measures implemented to reduce the risk of direct impacts to rail transit and the indirect impacts that over time reduce the functionality of railroad systems and infrastructure critical to operations.

¹ Source: Federal Register Vol. 84 No 125, ACHP Sec V (G)

Direct Impacts:



Vegetation that falls along the track structure while trains are in transit can cause derailments and pose a high risk to the safety of employees, passengers, and the environment. These incidents can result in major injuries or death, impact to environment and millions of dollars in damage, repair, and replacement of assets.



Slippery rail is caused by the fall of leaves on track structure that inhibits the proper brake functions of rail transit cars. This significantly impacts the performance of operations at times causing speed restrictions and significant delays in service. Trains depend on friction between the steel rails and steel wheels for traction and braking. Anything that reduces friction between the wheels and rails can create dangerous problems for trains in transit or maintenance crews on hi-rail equipment. Leaves in the fall are crushed between the wheel and rail releasing water and plant sap, which acts as a lubricant. This directly affects the braking/stopping distances required depending on the train's weight, speed, and the slope involved.



Line of sight and clear visibility is important both for railroad personnel working on or near trains and for motorists crossing railroad tracks. Motorists must be able to see trains as they approach crossings. Train engineers and other operating personnel must be able to see all types of railroad signals. These signals indicate the status of the traffic on the track ahead and indicate when whistles must be sounded as the train approaches a road crossing. Signs adjacent to the track also provide important information and must be kept visible. Employees

must be able to visually inspect moving rail equipment. Locomotive engineers must be able to see around curves and see that switches and derails are in the correct position. Trees and plants can short out electrical equipment and cause failure of communication systems and signals. To ensure proper functioning of signals and communication lines, Federal laws require vegetation control.

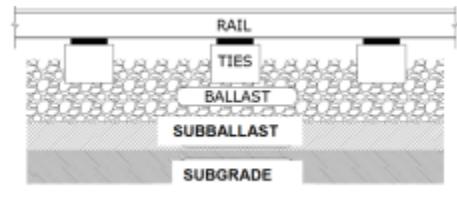
An additional problem occurs with tree canopies or tall woody vegetation growing near and encroaching on the roadway and assets. This represents a risk to proper operations of assets and increases the potential for failure of critical assets during weather events. It also inhibits proper access to inspections and asset maintenance.

In dry weather, vegetation within and along the roadbed is easily set on fire by sparks from steel brake shoes on steel wheels. The exhaust from diesel locomotives is another source of sparks, particularly as the throttle position is being increased or decreased. Track maintenance activities such as cutting, grinding, or welding rail are another ignition source. In order to minimize the potential for fires, the Commonwealth of Massachusetts requires by statute (Section 160 Chapter 235A) that railroads keep the full width of their rights-of-way clear of flammable material, including vegetation.

Indirect Impacts:

Vegetation on railroad ROWs may contribute to railroad accidents by causing or obscuring infrastructure defects. In 2024, there were 1,927 total accidents nationwide which resulted in 201 injuries and \$344,534,265 of damage, according to Federal Railroad Administration (FRA) statistics. Of these accidents, 416 were caused by track which resulted in three injuries. For the five year period between 2020 and 2024, there were 14 accidents caused by track in the Commonwealth of Massachusetts which resulted in \$10,667,483 of damage.

Vegetation within the railroad roadbed increases the probability that a track or roadbed defect will go undetected resulting in greater potential for an accident or incident. Minimizing the frequency and severity of accidents and incidents that result from undetected track and roadbed defects is of primary importance to the railroad industry. For this reason, FRA regulations (CFR 49 Part 213.37) require that vegetation be controlled so as not to interfere with the track inspector's duty. The inspections are normally done from a hi-rail vehicle supplemented, when necessary, by walking inspections of switches and other complicated track work. It is essential that the railroad roadbed be kept weed free to provide the track inspector with unobstructed views of the track structure.



In addition, vegetation in the roadbed hinders other methods of track inspection as well. Railroads employ electronic rail testing contractors to periodically test rails for internal defects. This testing is done by special rail cars that establish a magnetic field around the rail. Vegetation adjacent to the rails hinders this process and results in invalid tests. Other special rail cars measure track geometry such as surface, alignment, and gage. The gage measurement is done optically and is adversely affected by vegetation between the rails.

Vegetation in the roadbed can cause structural damage over time. The roadbed consists of crushed stone or gravel and is compacted around and under the rail ties to support them vertically and laterally. Pore space in the ballast allows water to drain away from the ties and into drainage ditches, which carry it away from the track. Dirt falling from passing trains or washed and/or blown in can provide adequate seedbed areas for some plants. Plant seeds carried to the track area by the same mechanisms as the dirt can sprout and begin to develop. As these plants grow, they send out roots which extend through the ballast. Over time, with the growth of new roots and the annual dying and decaying of old roots, organic soil accumulates. This organic soil provides a seed bed for new plants to colonize and increases the moisture content in the soil.

The drainage capacity of the ballast is then greatly reduced, and the increase in moisture retained around the ties contributes to their decay. During rain, the fouled ballast can retain enough moisture to become saturated. This results in a loss of support for the track, both vertically and laterally, leading to movement under the train that can cause deflection of the rail. A rail deflection while trains are in transit can cause derailment.

Vegetation also creates unsafe conditions for railroad workers, particularly crews that may be at work at any hour and in any weather. These workers require clear access while conducting maintenance activities. The vegetation itself may be a hazard or it may conceal objects or areas of unsafe footing.

VI. INTEGRATED VEGETATION MANAGEMENT

The objective of Keolis' IVM program is to minimize the use of herbicides to address public, environmental, and economic concerns. Due to the unique structure of the railroad ROW, different areas require different methods of vegetation control. The method used will be based on the site and species targeted. A team of professionals comprised of railroad roadmasters, engineers of track, certified arborists, environmental scientists, vegetation control and herbicide application specialists work around a complex schedule to execute the YOP. A combination of control methods is planned annually based on site conditions. During the 5-year period, Keolis will monitor and evaluate the success of the program and integrate appropriate methods in the YOPs consistent with this VMP.

The integrated approach involves careful planning, organizing, and implementing of a comprehensive program that includes chemical, physical, and, wherever practicable, natural controls.

The IVM is employed to balance safe, reliable, and cost-effective vegetation management while minimizing the use of herbicides in order to reduce the risks to human health and the environment. The program is intended to discourage succession growth via selective chemical and mechanical treatments.

The benefits of using an integrated approach include:

- Increase effectiveness of long-term vegetation control and management;
- Reduce environmental impacts on land, water, habitat, and wildlife;
- Reduce environmental, health, and safety risks;
- Lower overall vegetation management costs over time.

The IVM incorporates various methods of vegetation management. The IVM will manage and control vegetation utilizing a combination of methods as deemed practicable. These methods are:

1. **NATURAL, CULTURAL, BIOLOGICAL METHODS:** Natural, cultural, biological controls of pests when practicable can be implemented and managed efficiently along utility and vehicle ROWs. Although these methods can be effective in other ROW settings, they are not as effective in eradicating vegetation along the railroad roadbed and adjacent infrastructure which requires a combination of methods for control of vegetation.

2. CHEMICAL CONTROL METHODS: Herbicides are an effective method used to control vegetation along the railroad ROW. The chemicals used are only those listed on the MDAR Rights of Way Sensitive Area Materials List. Chemical controls are applied based on time of year and site conditions. Generally, pre-emergent application occurs in late spring, foliar application occurs in late summer/fall, and spot treatment of targeted species occurs as needed throughout the year. Due to the concerns about the environmental impact and potential health risks associated with glyphosate, in recent year Keolis has adopted a glyphosate free herbicide application program. The chemical control methods are further described in more detail in section VII.

3. PHYSICAL CONTROL METHODS: This methodology is used throughout the year in areas of the ROW outside of the roadbed, mainly to control trees and shrubs, or other vegetation greater than 12 feet in height. The various methods are described in more detail in Section VII. There are several benefits to physical control methods including:

- Increase duration of sun exposure to promote drying of tracks.
- Reduce amount of leafy debris on/around rails which further reduce brake effectiveness and slippery rail conditions.
- Remove vegetation inhibiting line of sight from populated areas, stations, curves, signals, crossings, etc.
- Reduce and or eliminate vegetation along the ROW that are within sensitive areas where chemical controls cannot be used.

To date, no environmentally safe and economically feasible alternative to herbicides has been developed for use in areas of the right-of-way requiring the eradication of all vegetation. The Massachusetts Railroad Association has tested alternatives without success. These tests included a steam application, which required 7,000 gallons of potable water and several hundred gallons of diesel fuel for heating the water per mile. It resulted in partial control lasting about one week. In another test, an application of a fish by-product resulted in approximately ten percent control of target vegetation. No mechanical equipment has been developed that will operate in close proximity to the track components in the roadbed area. In 1996, Consolidated Rail Corporation built and tested a mowing machine for target vegetation growing in the roadbed and ballast. This machine was completely ineffective at removing vegetation below the top-of-rail height and fouled the ballast with clippings creating both drainage problems and a fire hazard. Finally, the movement of trains, often at high speeds, makes manual weed control dangerous and impracticable for the management of hundreds of miles of track. As a result, vegetation management in these areas is limited to the selective application of herbicides to target vegetation along the railroad roadbed further detailed in Appendix F.

The use of herbicides, however, continues to drop as the result of new products entering the market allowing for lower rates using ounces per acre instead of pounds per acre, as well as new technologies in application equipment. Spray booms are independently controlled according to left side, center, and right side allowing the operator to shut off the application to areas lacking target vegetation. When herbicide use is needed, the type and density of vegetation, site condition, and the time of year will be factors in determining the herbicide type, application rate, adjuvants, and application equipment. These factors will be selected to attain maximum control and minimize any unreasonable adverse effects. In railroad yards and on certain heavily vegetated areas of the ROW, pre-emergent herbicides may be applied which may result in a reduction or elimination of a post-emergent treatment that same year. Each herbicide treatment will be tailored to the specifics of the site, sensitive area proximity, vegetation, and local environmental factors. The specific details regarding the herbicides to be used will be included in each YOP following the MDAR approved sensitive materials list.

In summary, the VMP is an integrated vegetation management approach that incorporates the best available technologies with best management practices in an effort to reduce chemicals use over time. Keolis' vegetation management program does not rely on a fixed application schedule due to logistics in planning and annual maintenance activities. The railroad ROW maintenance activities depend on site conditions, inspection findings and vegetation target requirements of the roadway and adjacent overhead encroachment of vegetation, amongst other. As a best management practice, at times, railroad maintenance activities such as rail tie replacement and construction may negate the need for the vegetation controls such as chemical application and or mechanical controls on specific areas. This is planned ahead of the YOP in order to schedule vegetation control activities only to those locations and areas determined by field assessment where the IVM approach is to be implemented. (See Operational Procedure, Section VIII).

VI.1 Vegetation Management for the Railroad ROW

The American Railway Engineering and Maintenance-of-Way Association (AREMA) recommended clearance for pole lines, signal structures, low voltage (0-750 volts) power, communication, fiber and signal lines is *minimum* 3 feet for side and overhead and vegetation should be clear below the wire lines to the ground.

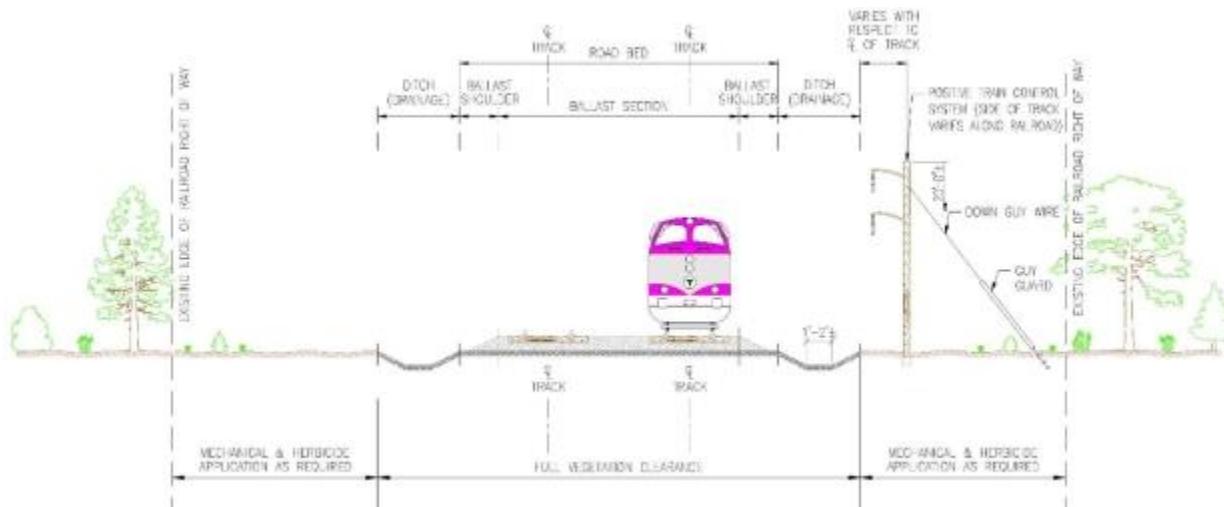


FIGURE 2
ROW SECTIONS AND REQUIRED VEGETATION MANAGEMENT AREAS

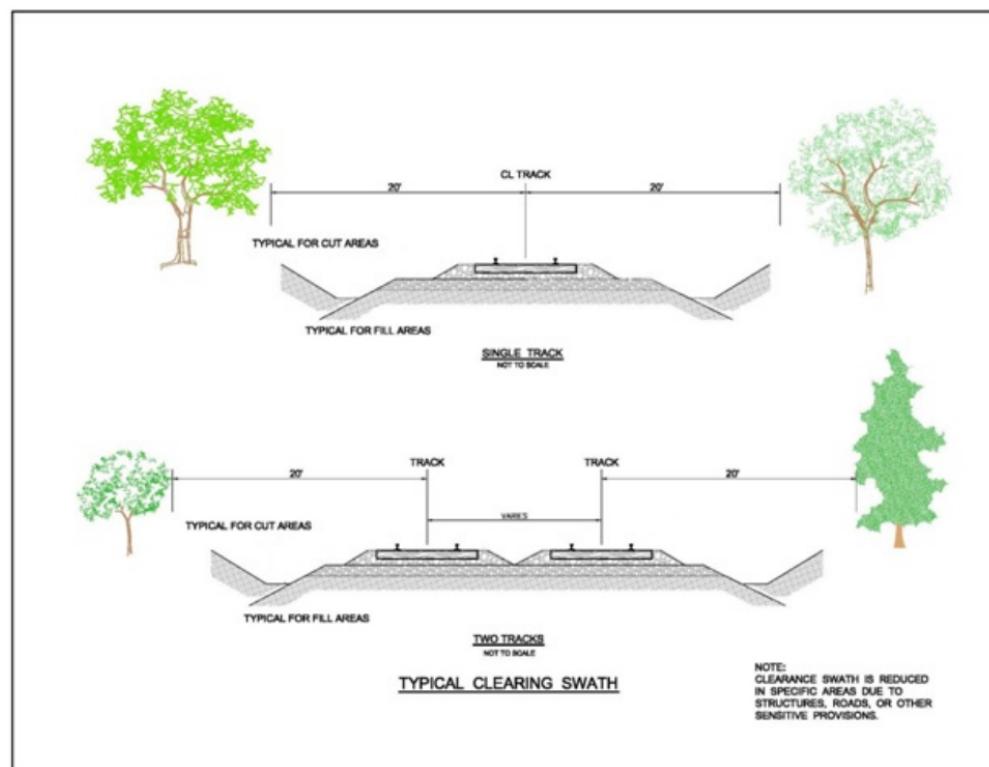


FIGURE 3
TYPICAL CLEARING SWATH (AREMA)

Figures 2 and 3 illustrate typical railroad ROW cross-section and vegetation control areas. Vegetation growing in areas adjacent to the shoulder will be managed to promote the growth of low growing shrubs and herbaceous plants when practicable. Shrubs in these areas provide a visual screen blocking the view of railroad traffic and serve to reduce the noise from rail traffic in adjacent areas. However, the railroad ROW property boundary lines vary significantly in extent between municipalities, which makes the application of controls to vegetation prone to the conditions of the areas. For safety reasons, all vegetation encroaching along the rail ROW shall be removed to ensure clear passage of rail traffic. Vegetation encroaching the ROW requires a combination of both chemical application and mechanical methods of removal. The IVM allows treatment and eradication of target nuisance vegetation or invasive species as identified in the field.

Keolis contracts the services of Certified Professional Arborists that follow ANSI A300 evaluation tools for the identification of trees and Professional Wetland Scientist (PWS) to conduct evaluations of the best approach for the management of specific target species. When necessary, a PWS experienced in invasive species removal and management in both wetland and upland areas is contracted to oversee and guide the treatment and application of herbicides by a certified applicator and/ or the mechanical approach. The table below represents a summary of the most prevalent target species that can be found along the railroad ROW and has been prepared by wetlands scientists who have worked with Keolis to evaluate methodologies for control and eradication. Plants listed in the table below are the most common and anticipated target and invasive species encountered along the MBTA Railroad Corridors. For a more comprehensive list of potential invasive and nuisance species see: Invasive Plants (massaudubon.org).

Type of Vegetation	Mechanical	Chemical	Methods
HERBACEOUS			
Japanese Knotweed	Yes	Best	Hand cut, stem application of herbicide and removal prior to seed development of small patches. Herbicide foliar spray large colonies.
Purple loosestrife	Yes	Yes	Hand removal of individual plants, including root ball.
Reed canary grass	Yes	Yes	Hand removal of small patches. Foliar spray of large colonies if necessary.
Common reed/phragmites	Yes	Best	Cut and stem application of herbicide prior to seed head development for large colonies.
Garlic mustard	Yes	Yes	Hand pull small patches where encountered
Dames rocket	Yes	Yes	Hand pull small patches where encountered
Goutweed	No	Best	Best removal is selective foliar herbicide of individual plants
Pepperweed	Yes	Best	Hand pull small patches. Foliar herbicide of large, untenable invasive colonies.
Japanese stilt-grass	Yes	Best	Hand pull small patches. Foliar spray of large colonies.
Swallowwort (Black and Pale)	Yes	Best	Hand pull small patches. Foliar spray of large intrenched colonies.

ENVIRONMENTAL VEGETATION MANAGEMENT PLAN

KEOLIS

Type of Vegetation	Mechanical	Chemical	Methods
SHRUBS			
Multiflora rose	Yes	Yes	Hand or mechanical removal. Cut and stem treat herbicide in restricted access locations.
Glossy buckthorn	Yes	Best	Hand or mechanical removal. Cut and stem treat best method.
Common buckthorn	Yes	Best	Hand or mechanical removal. Cut and stem treat best method.
Bush honeysuckle	Yes	Yes	Hand or mechanical removal. Cut and stem treat in restricted access locations.
Morrow honeysuckle	Yes	Yes	Hand or mechanical removal. Cut and stem treat in restricted access locations.
Tatarian honeysuckle	Yes	Yes	Hand or mechanical removal. Cut and stem treat in restricted access locations.
Japanese honeysuckle	Yes	Yes	Hand or mechanical removal. Cut and stem treat in restricted access locations.
Japanese barberry	Yes	Yes	Hand or mechanical removal. Cut and stem treat in restricted access locations.
European barberry	Yes	Yes	Hand or mechanical removal. Cut and stem treat in restricted access locations.
Burning bush	Yes	Best	Hand or mechanical removal. Cut and stem treat best method.
Autumn olive	Yes	Yes	Hand or mechanical removal. Cut and stem treat in restricted access locations.
VINES			
Asiatic Bittersweet	Yes	Best	Hand or mechanical removal. Cut and stem treat in restricted access locations.
Mile a minute vine	Yes	Yest	Hand pull small patches. Foliar spray large colonies and entanglements.
Japanese hops	Yes	Yes	Hand pull small patches. Foliar spray large colonies and entanglements.
Kudzu	Yes	Best	Hand pull small patches. Foliar spray large colonies and entanglements.
TREES			
Norway Maple	Yes	Best	Hand or mechanical removal small seedlings. Cut and stump treat large trees.
Black Locust	Yes	Best	Hand or mechanical removal small seedlings. Cut and stump treat large trees.
Tree of Heaven	Yes	Best	Hand or mechanical removal small seedlings. Cut and stump treat large trees.

Type of Vegetation	Mechanical	Chemical	Methods
OTHER NATIVE/ NATURALIZED BUT POTENTIALLY NUISANCE SPECIES			
Poison Ivy	Yes	Best	Cut and remove small entanglements with GREAT CARE! Foliar spray large entanglements.
Virginia Creeper	Yes	Yes	Selectively trim vines where facility infrastructure is endangered by entanglement.
Grape	Yes	Yes	Selectively trim vines where facility infrastructure is endangered by entanglement.
Wysteria	Yes	Best	Selectively trim vines where facility infrastructure is endangered by entanglement.
Giant hogweed	Yes	Best	Cut and remove individual plants with GREAT CARE! Foliar spray individual plants as necessary.

Areas along the ROW containing overhead signal, communication lines, Positive Train Control lines and other railroad assets and infrastructure, require elimination of vegetation which interrupts maintenance access, and which may cause disruption of service. In these areas, where practicable, low growing shrubs and herbaceous plants will be maintained and encouraged in an effort to reduce the invasion of tall growing trees into these areas. Trees and tree canopies growing near overhead and or encroaching ROW signal and communication lines must be trimmed or removed to ensure safety of railroad operations.

Vegetation on the areas along and within the ROW will be controlled as described below for the following locations.

A. Roadbed

Figure 1 depicts a typical railroad ROW. The roadbed is a man-made structure which consists of the rail and ties, ballast, ballast shoulder, and its drainage system. The ballast and ballast shoulder are constructed of hard stone that supports the track. It distributes the load on the track evenly and drains water away from the roadbed. The roadbed drainage system is constructed to carry water draining out of the ballast away from the track. **The roadbed portion of the ROW requires total elimination of vegetation.**

B. Bridges

Some open deck bridges, such as those over water, will not be treated with herbicides. Roadbed approaches to bridges will be treated up to the abutment backwall and reduced as necessary to maintain required setbacks to sensitive areas. Stonework in bridge abutments and similar structures must be treated because plant roots can loosen and destroy mortar in cracks.

C. Culverts

Culverts are generally constructed with steel pipe, concrete pipe, clay or stone and are normally placed at right angles to the track. Culverts which are not of sufficient length to extend beyond the *roadbed* spray pattern in addition to the required buffer per standards defined within 333 CMR 11, or which are shallow to the roadbed and constructed of stone and could allow herbicide to enter a watercourse, will *not* be treated with herbicide. Mechanical and or manual methods of vegetation removal will be employed.

D. Ditches

Drainage ditches must be maintained vegetation-free to permit the flow of water away from the ballast and track structure and maintain a stable roadbed. Drainage is a very important function in providing a stable track roadbed. Ditches of all types are part of the general track maintenance activities and require periodic maintenance to preserve their function. Excess vegetation, talus, and erosional deposits should be removed to sustain positive ditch drainage.

Ditches that present wet conditions will *not* be treated with herbicides. Mechanical and or manual methods of vegetation removal will be employed. Ditches will be maintained by herbicide applications when no water is present and by mechanical means otherwise or when no wet conditions are met a combination of both.

E. Grade Level Road Crossings

At grade level road crossings vegetation will be controlled via chemical and or mechanical methods to provide safe and clear lines of sight between motorists and rail traffic.

F. Railroad Signals, Signal Cases, and Signs

The area around railroad signals, signal cases, and signs will be maintained weed free providing a safe line of sight between the engineer and the signals or signs and to permit access to maintenance of this equipment. In these locations a combination of chemical and/or mechanical methods will be employed following site condition requirements.

G. Inside Curves

In the area adjacent to the shoulder, on the inside of curves, vegetation will be controlled to allow railroad employees on the trains to inspect trains as they move around the curves and to allow for a clear line of sight. These areas will be controlled using chemical and or mechanical controls following site condition requirements.

H. Signal Systems and Communication Lines

Railroad utility lines along the roadway such as signal control houses, gate and signal mechanisms, and additional battery housings, Positive Train Control (PTC), communication lines and other, must be free of woody vegetation and brush to ensure safe usage and access for maintenance. The railroad utility lines must be maintained clear of vegetation for proper function and to protect assets from damage due to vegetation encroaching on the ROW. Clearances above, adjacent to, and below utility lines must remain clear of vegetation [Figure 2]. These areas will be treated with chemical and or mechanical controls following site condition requirements.

I. Railroad Facilities

Although railroad yards and storage facilities are an integrated part of the railroad system and will be managed in accordance with this VMP, they are not regulated by 333 CMR 11.00. Railroad facilities include yards, buildings, fueling facilities, and off-track areas. Yards are areas with multiple tracks and switches where trains are assembled, disassembled, and equipment is either staged and in transit or stored. These areas are critical for railroad operations and include other infrastructure such as signal towers and access to and from maintenance facilities.

As required under FRA, railroad yards are a part of the railroad network system that requires vegetation control to ensure areas are maintained weed free to allow safe and efficient operation, reduce fire hazards, and permit proper inspection of railroad track.

These areas will be maintained weed free with the implementation of chemical and or mechanical methods following Site condition requirements.

VII. VEGETATION MANAGEMENT METHODS

The VMP is defined by and limited to the property boundaries of the MBTA owned ROW for the Commuter Rail. On the ROW roadbed and other specialized areas along the railroad roadway as identified above in Figure 2 of Section VI, no vegetation is permitted as per Federal and State regulations. On other areas of the ROW, certain woody, vine, and brush species must be selectively managed as described in Section VI. 1. Therefore, methods of railroad ROW management are limited to two basic vegetation control techniques and one indirect method. The two basic vegetation control methods are chemical (herbicide) applications and physical (mechanical and manual). The indirect method includes any ROW operational activity that eliminates vegetation as a secondary benefit.

A. Physical Methods for Vegetation Control

Mechanical Equipment and Techniques

Mechanical control techniques using mowers, chain saws, brush saws, weed wackers and other manual tools are limited to woody and brush vegetation and will include target species along the ROW most specifically locations identified in Section VI, above. Mechanical techniques are mainly used to clear vegetation in the areas adjacent to the roadbed, especially where it interferes with communication lines, reduces visibility, and intrudes into the track zone. Mechanical control removes unwanted woody vegetation in areas restricted for herbicide application.

Mowing is the mechanical process of cutting a woody target species with cutting heads. The cutting heads are mounted on hydraulic arms that greatly extend the lateral reach of the equipment. These machines can be mounted on off-track, on-track, or hi-rail equipment. Large machines are used for railroad application because of the wide range of conditions found on the ROW. On-track equipment has the advantage of not having to operate over rough terrain. Off-track equipment can work independently of train movement, but production may be limited by the difficulty of moving over rough terrain. Off-track equipment also has the advantage of being able to operate under communication and signal lines. However, railroad safety guidelines may restrict the use of brush cutters within developed or recreational areas. Mechanical cutters, such as mowers, present certain safety problems that railroad personnel must take into consideration.

PWS's and MA Certified Arborists are consulted to ensure applicable methods and best management practices are utilized in the implementation of the IVM. Contracted arborists utilize tree hazards assessment techniques (ANSI A 300) to identify trees that pose a hazard. These experts are also consulted in the management of invasive species, as described in Section VI, above.

B. Chemical Application

Herbicides are pesticides used to control unwanted vegetation. Herbicides have been extensively applied on railroad ROWs to control vegetation because of their specificity, range of target species, degree of control, cost-effectiveness, and ease of application especially on hi-rail for roadbed application.

Herbicides are essential to eliminate vegetation on the ROW roadbed (the ballast/shoulder area). There is no known mechanical method for adequate eradication of vegetation along the ROW ballasted roadbed. The ballast and shoulder must be free and clear of all vegetation. This requirement necessitates that vegetation be eradicated including the root system.

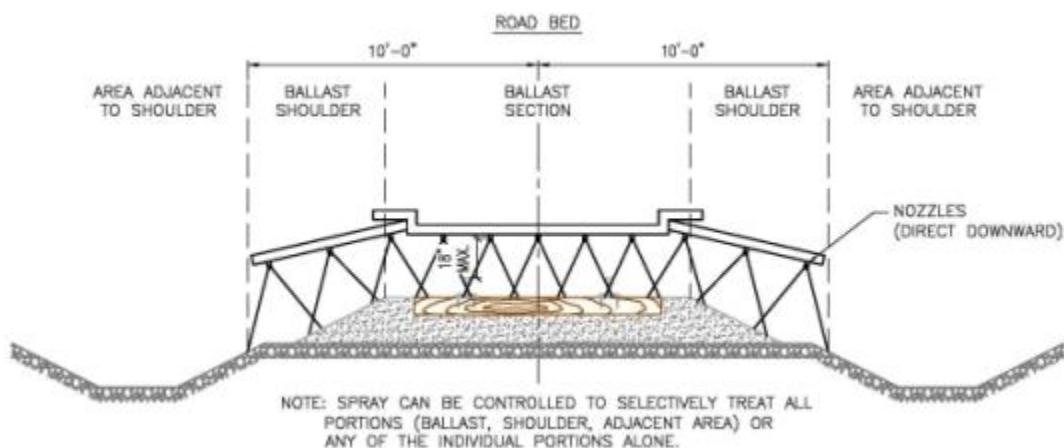


FIGURE 4
REAR MOUNTED SPRAY BOOM

Depending on the area to be treated, the species targeted, and time of application, an herbicide program can select from two categories of herbicide. The two herbicide categories are pre-emergent herbicides, which the plant absorbs through developing roots and/or shoot before emerging from the ground, and post-emergent herbicides, which the plant

absorbs through foliage and other green portions, or through woody portions of the plant (i.e. bark, stem, roots).

Vegetation targeted will be treated according to the site condition requirements and is mostly divided into two categories: weeds and brush.

Weed Control

The weed control program is designed to eliminate all vegetation located on the roadbed, around signs and signals, and in yards and other railroad facilities as listed in Section VI. Herbaceous vegetation is the primary cover type with a lesser number of shrubs and tree seedlings also present. A combination of pre- and post-emergent herbicides most often accomplishes the goal of complete vegetation eradication.

1. Pre-emergent Herbicide Program

The pre-emergent herbicide program is directed primarily to prevent vegetation growth along railroad yards, roadbed, railroad assets along ROW and adjacent areas and other locations where necessary following site condition requirements. This program is especially important regarding roadbed application to eradicate vegetation early in the growing season that may sprout along the rail roadbed, track structure, and critical assets included in Section VI.

The application of pre-emergent herbicides is also important for employee safety and clear access to inspect and maintain assets. Every year, pre-emergent herbicide is applied to the roadbed. All other applications along the ROW will depend on a review of the previous year's vegetation density and control efforts and an estimate of vegetation density for the upcoming season.

Pre-emergent herbicide application is accomplished from a hi-rail spray truck. This on-track vehicle has the advantage of not having to operate over rough terrain. These hi-rail trucks have a rear-mounted boom located approximately 18 inches above the ground (Figure 4). Spray nozzles are equipped with a spring-loaded shut-off valve to prevent dripping when the pressure is turned off.

Herbicide sprayed from hi-rail trucks is applied at low pressure, between 30 and 40 pounds per square inch (psi). Low pressure, as defined by CMR 333 11.02, shall be under 60 psi.

In Massachusetts, pre-emergent herbicide applications will be weather dependent and favorable weather conditions are required. If the weather conditions change, such as high wind, rain, temperature, inversion, etc., the applicator will stop immediately. Traditionally, with favorable weather conditions, a pre-emergent treatment may begin as early as March. However, historically in Massachusetts, depending on the winter and snow coverage on the ground, it is likely to begin late April into early weeks of May.

2. Post-emergent Herbicide Program

The post-emergent herbicide program is directed primarily for the control of vegetation throughout the growing season and is used for the eradication of target species along railroad ROW main lines, branch lines and other critical areas as described in Section VI following site conditions requirements.

Post-emergent herbicide application may begin in spring but is weather and target species dependent. It is most common and effective to plan for application when plants are fully grown in order to maximize track time with best time for application, Keolis has adopted to apply the post-emergent application throughout the summer and into the fall. All treated areas are later inspected, and the effectiveness of the treatment is evaluated. If necessary, a second treatment is selectively applied to vegetated areas (see CMR 333 11.03(8)).

Brush Control

The brush control program is designed to manage and eliminate vegetation in areas adjacent to the shoulder through the selective use of post-emergent herbicides. The application method will depend on the density of target vegetation and previous mechanical control methods. Where possible, shrubs and herbaceous vegetation that does not interfere with operations or locations listed in Section VI will be preserved.

Most target vegetation becomes resistant over time to the application of herbicides and as a result, Keolis and the applicator have adopted to annually alternate the herbicides applied from the approved MDAR sensitive materials list.

The intent is to prevent weed resistance and improve the efficiency of the YOP implementation.

There are several methods for the application of post-emergent herbicides to the target vegetation. The variety of methods allows the applicator to selectively apply the herbicide directly onto the target vegetation depending on the Site condition requirements. These applications are described below:

1. Foliar

Selective application of the herbicide to the foliage and or stem by a variety of low-pressure mechanical spray devices. This type of application is useful on busy, high speed rail lines where the work intervals between trains are too short for slower mechanical methods. The herbicides are applied under low pressure (30-40 psi). Selective foliar application will not be used on vegetation over 12 feet in height, except for side trimming (333 CMR 11.03 (5)). Side trimming, when done with herbicides, is the selective application of the herbicide to target portions of a tree and avoids removal of the entire tree. During side trimming operations in residential areas, the railroads will utilize low pressure herbicide application techniques and appropriate adjuvant or agents to minimize the drift of herbicides. Experience indicates minimal drift occurs, usually within 5 feet of side trimming operations, when using low pressure applications and adjuvants.

2. Stem

Selective application of the herbicide in a crop oil base carrier to the lower portion of the main stem (trunk of a tree). The equipment for basal spraying is often a manual-pump apparatus.

3. Cut Surface

Application of an herbicide to the stump immediately after a cutting procedure which may include mowing. Traditionally, the herbicide is manually painted or squirted directly onto the cut stump surface.

In summary, the use of post-emergent herbicides allows Keolis and applicators to selectively target species throughout the year and maximize utility of resources based on the application method. Stem and cut surface treatments are effective year-round and foliar brush control is mostly applied in late summer into early fall. As in weed control, all treated areas are later inspected and evaluated. Every consideration will be taken to minimize herbicide use while guaranteeing the overall safety of operations.

The benefits of herbicide application as a critical component for the effective management of nuisance vegetation along railroad ROW cannot be disregarded. As stated in Section VI, there is no adequate mechanical method available for controlling vegetation on railroad ROW roadbed and other areas, which must be kept free of *all* vegetation as a Federal safety requirement [49 C.F.R. §213.37]. The safety of passengers, employees, the general public and environment requires a managed approach towards ensuring the ROW vegetation is controlled and eradicated to reduce the risks posed by interference of vegetation with operations, federally mandated inspections and line-of-site amongst other direct and indirect impacts as listed in Section V.2. Keolis employs the use of registered herbicides specifically labeled for use on ROWs and approved by the EPA and Commonwealth of Massachusetts through extensive science-based risk analysis. As a general guidance under MDAR, when an approved herbicide is used to treat target species, it is expected then, to have no unreasonable adverse effects to the general public and the environment, if the application follows an approved VMP and YOP in compliance with both Federal and State regulations and it is applied by a Massachusetts certified applicator (in the category Right-of-Way Pest Control). In addition, the use of mechanical techniques presents a risk to railroad workers.

Since herbicides are available in a wide variety of dry and liquid forms, it allows for Keolis and the applicator to select the most effective herbicide for the particular site conditions and target vegetation. Thus, the target plant may be selectively eradicated while minimizing impacts on non-target, desirable species. Limited, selective application of herbicides minimizes the chance of unreasonable adverse effects to the public and the environment. The applicator controls the pressure, selects the proper nozzle, and has absolute control at which speed the vehicle will travel the ROW.

The applicator is constantly monitoring the environment. If the weather conditions change, such as high wind, rain, temperature, inversion, etc., the applicator will stop immediately. Massachusetts Regulation 333 CMR 10.14 requires the applicator to keep daily records of herbicide spraying operations. The records include herbicide/adjuvant mixture components and proportions, equipment, rate of application, the exact location of treated and non-treated track and

adjacent areas, date of application, trade name of product and EPA registration number, applicator name, and target pest.

Trained licensed professional applicators, assisted by on-site railroad personnel and an Environmental Monitor, will apply herbicides chosen from the state recommended list [333 CMR 11.04 (1) (d) as applicable]² specific for the target vegetation and site. By using state-of-the-art equipment and specific adjuvants, the applicator will efficiently and economically manage the vegetation on the ROW.

VIII. SENSITIVE AREAS VEGETATION MANAGEMENT

Sensitive Areas have been defined in the Commonwealth of Massachusetts Regulation 333 CMR 11.04. A copy of the regulations is included in Appendix C. As described in 333 CMR 11.04, sensitive areas include any areas within the ROW including No Spray Area, and Limited Spray Area as defined below.

No Spray Area, any area that is both within a Right-of-Way and within:

- a. any Zone I;
- b. 100 feet of any Class A Surface Water Source;
- c. 100 feet of any tributary or associated surface water body where the tributary or associated surface water body runs within 400 feet of a Class A surface water source;
- d. 10 feet of any tributary or associated surface water body where the tributary or associated surface water body is at a distance greater than 400 feet from a Class A surface water source;
- e. a lateral distance of 100 feet for 400 feet upstream, on both sides of the river, of a Class B Drinking Water Intake;
- f. 50 feet of any identified Private Well;
- g. 10 feet of any Wetlands or Water Over Wetlands;
- h. 10 feet of the mean annual high-water line of any river; and 10 feet of any Certified Vernal Pool.

Limited Spray Area, any area that is both within a Right-of-Way and within:

- a. any Zone II or IWPA;
- b. a distance of between 100 feet and 400 feet of any Class A Surface Water Source;
- c. a distance of between 10 and 200 feet of any tributary or associated surface water body where the tributary or associated surface water body runs outside the Zone A for the Class A surface water source;
- d. a lateral distance of between 100 and 200 feet for 400 feet upstream, on both sides of the river, of a Class B Drinking Water Intake;
- e. a distance of between 50 and 100 feet of any identified Private Well;
- f. a distance of between 10 and 100 feet of any Wetlands or Water Over Wetlands;
- g. a distance of between 10 feet from the mean annual high water line of any river and the outer boundary of the Riverfront Area;
- h. a distance of between 10 feet from any Certified Vernal Pool and the outer boundary of any Certified Vernal Pool Habitat; and a distance of 100 feet of any Agricultural or Inhabited Area.

The most common types of sensitive areas encountered are areas within 100 feet of standing or flowing water or wetlands.

Those sensitive areas that have been delineated with permanent markers in the field include all areas listed above under No Spray Areas and Limited Spray Areas with the following exceptions: agricultural areas, inhabited areas, and areas of intermittent standing or flowing water such as in drainage ditches. These areas are considered readily identifiable in the field and are not delineated with permanent markers.

Within "sensitive areas" only a limited number of herbicides that have been approved for these areas by DAR and DEP can be applied. Additionally, no herbicides, including those of which are approved for sensitive areas, can be applied within 10 feet of standing or flowing water.

² Source: <https://www.mass.gov/service-details/rights-of-way-sensitive-area-materials-list>

A. Identification and Location of Wells and Surface Water Supplies

The Commonwealth of Massachusetts, Department of Environmental Protection, Drinking Water Program has developed data and overlay maps highlighting public water supplies, aquifers, tributaries, and drainage basins for most of the State. The MDAR maintains a registry of private wells for the State of MA.

Local sources of information include the conservation commissions, Water Departments, and Boards of Health. Keolis utilizes the private wells on record in MDAR's Private Well Registry to incorporate into the maps. The identification and delineation of private wells in the Commonwealth of Massachusetts is an ongoing process. In addition to the registry review, on a yearly basis a written inquiry to the Board of Health (BOH) in each municipality is issued regarding the existence of any new and/or omitted private wells. Upon notification, any new private well is included in the Yearly Operational Plan mailing and within a Public Notice and identified accordingly in the Maps.

The preparation of Maps for each community include field verification of areas and the use of topographic maps identifying the locations of public wells and surface water supplies. The specific locations were obtained from MassGIS overlay map layers provided by the MassDEP and the Drinking Water Program and information provided by towns BOH and or Conservation Commissions.

B. Identification and Delineation of Wetlands

The following definition and description are from the Wetlands Protection Act Regulations 310 CMR 10.55 (2):

Definition, Critical Characteristics and Boundary

1. Bordering Vegetated Wetlands are freshwater wetlands which border on creeks, rivers, streams, ponds and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The ground and surface water regime and the vegetational community which occur in each type of freshwater wetland are specified in M.G.L. c. 131, § 40.
2. The physical characteristics of Bordering Vegetated Wetlands, as described in 310 CMR 10.55(2)(a), are critical to the protection of the interests specified in 310 CMR 10.55(1).
3. The boundary of Bordering Vegetated Wetlands is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist. Wetland indicator plants shall include but not necessarily be limited to those plant species identified in the Act. Wetland indicator plants are also those classified in the indicator categories of Facultative, Facultative+, Facultative Wetland-, Facultative Wetland, Facultative Wetland+, or Obligate Wetland in the National List of Plant Species That Occur in Wetlands: Massachusetts (Fish & Wildlife Service, U.S. Department of the Interior, 1988) or plants exhibiting physiological or morphological adaptations to life in saturated or inundated conditions.
4. Areas containing a predominance of wetland indicator plants are presumed to indicate the presence of saturated or inundated conditions. Therefore, the boundary as determined by 50% or more wetland indicator plants shall be presumed accurate when:
 - a. all dominant species have an indicator status of obligate, facultative wetland+, facultative wetland, or facultative wetland- and the slope is distinct or abrupt between the upland plant community and the wetland plant community;
 - b. the area where the work will occur is clearly limited to the buffer zone; or
 - c. the issuing authority determines that sole reliance on wetland indicator plants will yield an accurate delineation.
5. When the boundary is not presumed accurate as described in 310 CMR 10.55(2)(c)1.a. through c. or to overcome the presumption, credible evidence shall be submitted by a competent source demonstrating that the boundary of Bordering Vegetated Wetlands is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist. The issuing authority must evaluate vegetation and indicators of saturated or inundated conditions if submitted by a credible source or may require credible evidence of saturated or inundated conditions when determining the boundary. Indicators of saturated or inundated conditions sufficient to support wetland indicator plants shall

include one or more of the following:

- a. groundwater, including the capillary fringe, within a major portion of the root zone;
- b. observation of prolonged or frequent flowing or standing surface water;
- c. characteristics of hydric soils.

6. Where an area has been disturbed (e.g. by cutting, filling, or cultivation), the boundary is the line within which there are indicators of saturated or inundated conditions sufficient to support a predominance of wetland indicator plants, a predominance of wetland indicator plants, or credible evidence from a competent source that the area supported or would support under undisturbed conditions a predominance of wetland indicator plants prior to the disturbance.

Small wetlands, variable wetland situations, and the specific boundary to any wetland must be determined in the field.

C. Field Procedure

1. Preparation

Prior to doing the field work, appropriate field maps will be consulted to determine the general location of sensitive areas on the railroad ROW.

2. Boundary Establishment

The sensitive area boundaries are field verified and included in maps, and physically marked along the ROW. All boundaries use minimum setback distances specified in the regulations. Boundaries are marked on the tracks using color coded plates screwed to the ties, color coded paint applied to the base of rails and ties, or color-coded posts adjacent to the track. Boundary markers are placed on the track at a point where the sensitive area intersects with the track plus the required setback distance. In most locations, the boundary marker was placed as much as 15 feet beyond the minimum to find the best, strongest, and most visible location for the marker.

The occurrence of standing water in manmade drainage ditches will not be used as a principal indication of wetlands. The four major indications are vegetation, topography, soils, and hydrology. (Hydrology of a site relates to the distribution and circulation of water on the surface and in the soil). Vegetation and signs of obvious hydrology will be used to determine wetland boundaries according to the DEP Wetland Protection Act Regulations. Soils are helpful in verifying wetland boundaries but will not be used as a determining factor in typical situations. Vegetation responds quickly to changes in soil moisture and drainage. Plants are more likely to indicate newly forming wetlands, or wetlands that are in the process of enlarging. Soils are useful as indications of long-term hydrologic conditions. They are especially useful for disturbed sites and drier wetlands lacking typical wetland plants.

Topographic depressions where water collects, or where the water table is close to the surface, usually allow the development of wetlands. The boundary of a wetland in a low, flat area surrounded by hilly terrain often corresponds to the "break" in the slope, or the point at which the land begins to flatten.

Once the boundary of a wetland has been established distances will be measured to establish appropriate no-spray and buffer zones. Permanent boundary markers will be installed along the ROW and color coded to indicate the proper spray status of the area to the herbicide applicator and the Environmental Monitor.

3. Approval of Findings

The Conservation Commission of each municipality is given the opportunity to observe and inspect the wetland boundary markers. A Request for a Determination of Applicability was filed with each Conservation Commission pursuant to the Wetland Protection Act regulations, 310 CMR 10.05 (3) a.2. Form 1 was accompanied by a map of the ROW indicating the location of the boundary markers on the track and type of delineation that was made for each community. These determinations are effective for the duration of the VMP as specified in 310 CMR 10.05 (3)(b)(1).

Data relating to the following is submitted to the Conservation Commission in each town as part of the YOP.

- a. Maps, or updates thereof, locating the ROW and sensitive areas not readily identifiable in the field.
- b. Herbicides proposed including application rates, carriers, adjuvants
- c. Herbicide application techniques and alternative control procedures proposed

- d. The company which will perform any herbicide treatment
- e. Identification of target vegetation
- f. Individual representing applicant supervising YOP
- g. Flagging methods to designate sensitive areas on the ROW
- h. Herbicide Fact Sheets as approved by the Department
- i. Procedures and locations for handling, mixing, and loading of herbicide concentrates.

D. Operational Strategies and Procedures

Vegetation control procedures within the railroad ROW will be made consistent with Federal and State regulations. The general vegetation control strategies will exclude the use of herbicides in any application that would result in drift to:

- a. any Zone I;
- b. 100 feet of any Class A Surface Water Source;
- c. 100 feet of any tributary or associated surface water body where the tributary or associated surface water body runs within 400 feet of a Class A surface water source;
- d. 10 feet of any tributary or associated surface water body where the tributary or associated surface water body is at a distance greater than 400 feet from a Class A surface water source;
- e. a lateral distance of 100 feet for 400 feet upstream, on both sides of the river, of a Class B Drinking Water Intake;
- f. 50 feet of any identified Private Well;
- g. 10 feet of any Wetlands or Water Over Wetlands;
- h. 10 feet of the mean annual high-water line of any river; and
- i. 10 feet of any Certified Vernal Pool.

On the railroad roadbed, no suitable alternative to herbicide vegetation control is currently available. On areas adjacent to the roadbed, a combination of chemical and mechanical methods will be used for vegetation control, utilizing the IVM approach and best management practices. Herbicide treatments may be used to control target vegetation re-growth. The selection of the herbicide and method of application will depend on the type and density of target vegetation present. In the area adjacent to the shoulder where herbaceous and some low-growing, woody plants can be encouraged, selective cutting (including stump treating) of tall-growing trees will be used as needed.

All notification procedures required by State regulations will be followed. Several days prior to scheduled maintenance activities, a railroad track inspector, or other person familiar with the boundary marking system, equipped with boundary maps and/or log sheets will review the area scheduled for treatment to ensure all boundary markers are in place and visible.

All herbicide applicators working on the ROW will be accompanied by a railroad Environmental Monitor experienced in the VMP and YOP process and regulations and trained to observe the boundary markers and areas not readily identifiable in the field. The Environmental Monitor is equipped with the maps of the ROW and other required documents. A railroad company pilot vehicle will proceed approximately 1/4 mile ahead of the spray vehicle to alert the spray vehicle to the presence of persons on or adjacent to the ROW or any other pertinent conditions. The railroad Environmental Monitor may ride in the pilot vehicle or the spray vehicle to best suit operating conditions. When moving into or out of no-spray areas, the certified applicator/worker in control of the spray vehicle, will be signaled by the railroad Environmental Monitor or by the pilot vehicle, to cease or commence spraying.

IX. OPERATIONAL GUIDELINES FOR APPLICATORS RELATIVE TO HERBICIDE USE

A. Guidelines for Sensitive Areas

1. Site Review

Every year a review of the vegetation conditions will be conducted to plan the YOP with railroad personnel and contractors. The review of ROW conditions will be made by the track inspector, building and bridges inspectors, the Environmental Monitor and or other persons experienced and knowledgeable in vegetation management and ROW conditions. On the areas adjacent to the shoulder, the need for and type of control will be identified, and the treatment required will be determined for target species. The density and type of target species present will be noted in each area for use in developing a control strategy.

2. Office Procedures

All available information for ROW vegetation management requirements will be analyzed utilizing available plans, inspections, GIS methods or other to determine the schedule priorities and target species. Areas scheduled for construction or other activity that will relate to or eliminate the need for vegetation maintenance, at that time, will be identified. If the vegetation on these areas will be controlled or eliminated, they will be removed from further consideration in the program now being developed. Next, the sensitive areas delineated will be reviewed to ensure that appropriate measures have been taken to protect these areas. The treatment methods prescribed in each sensitive area buffer zone will be reviewed and, whenever possible, a mechanical or more selective herbicide application prescribed. No-spray areas will be reviewed as to the overall vegetation conditions occurring, and mechanical methods will be used to selectively remove or side trim trees leaning into the roadbed area. New and developing vegetation control techniques will be reviewed to determine whether or not a suitable alternative to herbicide applications has been developed for use on the roadbed in sensitive areas.

This analysis will provide the site-specific information required in the YOP. The YOP will be developed and submitted to DAR for approval as per 333 CMR 11.06(1) at the beginning of the calendar year.

B. Preparation for Herbicide Application

At least a 21-day notice prior to the scheduled application date, will be given to the Department of Agricultural Resources, Conservation Commission, Board of Health, Mayor, and local public water suppliers in each community following Massachusetts State regulations.

Prior to the scheduled application date, a qualified railroad employee will traverse the treatment area with the sensitive area maps and record to ensure that all boundary markers are in place and visible.

1. Basic Requirements

To protect the public welfare and eliminate adverse impacts on the environment, railroad herbicide application crews must have an applicator who is licensed and certified in the Commonwealth of Massachusetts Category 40. Applicators must also have a Field Supervisor who reports daily to the railroad representative or other qualified railroad employee who is assigned to this task. The railroad is responsible for adherence to this VMP by railroad employees or their contractor. Applicators must follow all railroad safety regulations and all herbicide label directions.

a. Daily Field Report of Vegetation Control Activities

The daily field report of vegetation control activities will be filled out each day by operators doing the work. The daily field report will include, but not be limited to:

- Date
- Vehicle and Equipment Numbers
- Track Name, Number, and Designation

Chemical Received

- Chemical Name
- Number of Containers
- Vehicle Number
- Quantity lbs./gals.
- Chemical Left or Forwarded

Weather

- Wind Velocity at time 6am 9am 12pm 3pm 6pm
- Wind Direction at time 6am 9am 12pm 3pm 6pm
- Temperature at time 6am 9am 12pm 3pm 6pm
- Rain (in inches) at time 6am 9am 12pm 3pm 6pm

Acres Treated

- Roadbed Area
- Branch
- Area Adjacent to the Shoulder
- Industrial Track
- Mainline
- Bridge
- Sidings
- Crossings

Daily Summary

- Beginning Time
- Total Hours Reported
- Ending Time
- Daily Beginning Odometer Reading
- Hours Treating
- Daily Ending Odometer Reading
- Contractor Person on Job (list each individual)
- Railroad Person on Job (list each individual)

Daily Summary of Chemicals Applied

- Name
- EPA Establishment No.
- EPA Registration No.
- Concentrate: gals/lbs.
- Mix Rate and Application Rate per Acre

Tank or Mix Number

- Chemical Name and Amount Added to Tank
- Water in Gallons or Inches of Depth
- Adjustments Names and Amount
- Location Where Water Taken

b. Herbicide Application Log

In addition to a daily Field Report, an Herbicide Application Log will be filled out. The herbicide log will include, but not be limited to:

- Time
- Mile Post and Location
- Spray Type and Meter Reading
- Gallons Per Mile
- Remarks: Spray Plan, City, Vegetation, Weather, etc.

2. Equipment Calibration

Calibration of herbicide application equipment is monitored on a daily basis by the applicator. While in the field, equipment is calibrated at the end of each day. The applicator cross references the total product applied, spray pattern, and distance traveled with meter readings. This allows the applicator to continuously monitor the amount of product applied per acre and adjust to insure the correct application rate.

3. Herbicide Application

The applicator will not handle, mix or load herbicide concentrate on a ROW within 100 feet of a sensitive area. Whenever possible, the applicator will handle, mix, or load herbicide while parked on a non-porous surface such as concrete or asphalt, but not within 100 feet of a sensitive area.

At the time of treatment, before the application begins, the herbicide applicator will review the sensitive areas, maps, and records with a qualified railroad employee. A pilot vehicle will proceed through the area approximately $\frac{1}{4}$ mile ahead of the spray vehicle to alert the spray vehicle of the presence of persons on or adjacent to the ROW or any other pertinent conditions. The railroad representative will alert the operator of the spray vehicle about the location of boundary markers or sensitive areas readily identifiable in the field so that the application can be regulated accordingly. In no-spray areas, as the applicator passes the boundary, they will visually verify that no herbicide is deposited in the area with the assistance of another employee. Water for mixing herbicide will be obtained from ponds or streams using DEP approved anti-siphon devices or from public water supplies in accordance with 333 CMR 13.02(1) (a) and (b).

X. ALTERNATIVE LAND USE

The railroad will review and evaluate new and innovative alternative land uses on the ROW. Safety considerations preclude most alternative land uses on the railroad ROW. The size, weight, and speed of trains and their cargoes being transported represent a hazard to any activity other than rail traffic inside the ROW boundary³. Even agricultural activities might interfere with the operation of the railroad by reducing visibility to inspect trains and impeding drainage away from the ballast area.

Some uses of the ROW that are compatible with railroad uses include construction and maintenance of electric distribution and transmission lines, telephone lines, and cable TV lines. Other uses that may be used on wider railroad ROWs are sewer and water lines and major pipelines.

Parties interested may submit alternative land use proposals for the railroad's consideration.

XI. REMEDIAL PLAN TO ADDRESS SPILLS AND RELATED ACCIDENTS

This remedial plan is offered as a guide to proper procedures for addressing pesticide accidents. The railroads contract with independent, licensed, herbicide applicators that are solely responsible for the containment, clean up, and reporting of all accidents and/or spills. Since every incident is different, applicators must weigh factors specific to the situation and use their own judgment to decide the appropriate course of action. The railroad employee escorting the applicator will be responsible for immediately reporting all spills to their supervisor.

Federal and state statutes establish emergency response procedures that must be followed by the companies and their contractors in the event of a spill or related accident. Under the Federal Environmental Pesticide Control Act, it is the applicator's legal responsibility to clean up pesticide spills resulting from their use and handling of the product. Applicators are liable for damages, subject to penalties, and obligated to clean up and decontaminate areas resulting from pesticide spills.

Because applicators normally carry only small amounts of herbicides, the potential for serious accidents is relatively small. The hi-rail vehicle also carries diesel fuel, motor oil, engine coolant, other fluids such as brake and hydraulic oil. The applicator will be prepared to take remedial measures in the event of a spill.

Applicators will carry the herbicide labels, Safety Data Sheets (SDS) for the chemicals being used, as well as equipment for emergency action including gloves, sand or other absorptive material, broom, shovel, and heavy-duty plastic bags or other leak-proof sealable containers.

A copy of the YOP shall be carried with the herbicide applicator. The YOP contains telephone numbers for the state police, local fire department, poison control center, herbicide manufacturer(s), and DEP, as well as a spill response checklist and SDS.

In the event of a spill or related accident, the following actions at a minimum shall be taken:

- Administer first aid if required (if necessary, call ambulance, Massachusetts poison information center);
- In case of contact with herbicides, decontaminate as directed by SDS, change clothing as appropriate, and

³ In certain rail lines, the Commuter Rail shares track use with freight.

- seek medical attention if appropriate;
- Call police in event of damage to property, or fire / explosion;
- If possible and safe to do so, control the spill and confine the spread of liquids with dikes, sand, and/or absorbent materials;
- Clean up spilled material as necessary and label any containers of contaminated materials for proper disposal;
- If unable to clean up entire spill with materials available, contact local police and fire department;
- Notify Massachusetts Department of Environmental Protection (DEP) immediately if a wetland, water body, or other sensitive area is threatened or contaminated by release of hazardous materials. DEP will be contacted when there is a spill of a reportable quantity, regardless of major or minor spill status.

The Comprehensive Environmental Response, Compensation, and Liability Act 1980 (CERCLA) 42 U.S.C. §9601 et. seq., and the Federal Water Pollution Control Act (CWA) 33 U.S.C. §125 et. seq. are aimed at eliminating the accidental discharge of oil and hazardous substances into the environment, providing for the cleanup of such substances, and establishing responsibility for costs of cleanup. CERCLA and CWA are implemented by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR §300 et. seq.

Massachusetts General Laws Chapter 21E, the Massachusetts Oil and Hazardous Material Release Prevention and Response Act, Section 3 authorizes the Massachusetts DEP to act to secure the benefits of the CWA and CERCLA to the Commonwealth by promulgating and enforcing a Massachusetts Contingency Plan, 310 CMR 40.000, establishes standards and procedures for the discovery of releases, notification of DEP, assessment of the release, and implementation of appropriate remedial response actions, as set forth in 310 CMR 40.500.

The Farm Chemical Handbook (published by Meister Publishing Co., Willoughby, Ohio), U.S. Department of Transportation "ERG - Emergency Response Guidebook", herbicide labels, and safety data sheets provide reference information for the chemicals being used. Applicators should carry equipment for emergency action including sand or other absorptive material, broom, shovel, and heavy-duty plastic bags or other leak-proof sealable container.

XII. IDENTIFICATION AND QUALIFICATIONS OF INDIVIDUALS DEVELOPING THE PLAN

Revision History

This document supersedes all previously issued versions.

Revision	Date Released	Updates	Author/Released/Edited by:
1	1990	New document	Paul A. Johnston Mr. Frank DeVilbiss
Multiple	1996-2014	Document revisions by previous operator	Previous Operator: MBCR
2	2015	Updates to the Operator Change from MBCR to Keolis Commuter Services, LLC.	Keolis Contractor FDCE: Kyle Fair, PE
3	2020	Updates to Sections: Formatting revised following MDAR requirements: Section I: changes to railroads included in VMP; Section II: Updated to introduction reflecting changes to Section I; Section III: Updates to goals and objectives related to changes in Section I; Section IV: Addition of Regulatory Framework applicability; Section V: Additional information related to requirements of railroad ROW vegetation management; Section VI: Additional information on IVM and representative figures; Section VII: Additional information on vegetation management techniques; and, Section XII: Revision History table added	Tim Dermody, FDCE Drew Bessette, FDCE Approved by: Clary Coutu, Keolis
4	2025	General updates.	Tim Dermody, Benesch Matt Donovan, Benesch Approved by: Ana Rita Pascoal, Keolis

ENVIRONMENTAL VEGETATION MANAGEMENT PLAN

KEOLIS

This 2026-2030 edition of the Vegetation Management Plan was edited and updated by Mr. Timothy Dermody and Mr. Matt Donovan, who serve in the railroad division of Benesch, a civil engineering firm located in Portland, Maine in consultation with and approval by Ms. Ana Rita Pascoal of Keolis Commuter Services, LLC. Ms. Pascoal is the Director of Environment and Sustainability for Keolis. She has a M.S. in Chemical Engineering from the University of Coimbra, in Portugal. She leads the environmental services, sustainability, and compliance program for the Commuter Rail on behalf of the MBTA. She has more than 20 years of experience in environmental management and more than 8 years of working knowledge and experience with the Federal Railroad Act, the Massachusetts Rights-of-Way Management Regulations, the Wetland Protection Act, and other regulations by which the railroad is obligated to perform for the implementation of the VMP and YOP.

The 2021-2025 edition of the Vegetation Management Plan was edited and updated by Mr. Timothy Dermody and Mr. Drew Bessette, of Fair Dermody Consulting Engineers, Inc., a civil engineering firm located in Portland, Maine in consultation with and approval by Ms. Clary Coutu of Keolis Commuter Services, LLC. Ms. Clary Coutu was the Director of Environmental Services, Compliance and Sustainability for the Commuter Rail. She has a B.S. in Environmental Science and Economics from Framingham State University. She led the environmental regulatory compliance program for the Commuter Rail on behalf of the MBTA. She has more than 15 years in program management and more than 8 years of full working knowledge and experience with the Federal Railroad Act, the Massachusetts Rights-of-Way Management Regulations, the Wetland Protection Act, and other regulatory standards by which the railroad is obligated to perform for the implementation of the VMP and YOP.

Mr. Dermody has a B.S. in civil engineering and has nineteen years of experience with the Massachusetts Rights-of-Way Management regulations. Mr. Bessette has a B.S. in civil engineering and is a licensed professional engineer in Maine, Massachusetts, New Hampshire, New York, Pennsylvania, Ohio, West Virginia, Virginia, North Carolina, South Carolina, Georgia, and Florida. He has four years of limited experience with the Massachusetts Rights-of-Way Management regulations. Mr. Donovan has a B.S. in civil engineering and has ten years of experience with the Massachusetts Rights-of-Way Management regulations. Mr. Dermody, Mr. Bessette, and Mr. Donovan have assisted Mr. Fair over the years, with many railroads with their implementation and adherence with the regulations.

The 2015-2020 edition of the Vegetation Management Plan was edited and updated by Mr. Kyle Fair, of Fair Dermody Consulting Engineers, a civil engineering firm located in South Portland, Maine. Mr. Fair had a B.S. in civil engineering and was a licensed professional engineer in Maine, Massachusetts, New Hampshire, Vermont, New York, Ohio, North Carolina, and South Carolina. He has fifteen years of experience with the Massachusetts Rights-of-Way Management regulations. Over the years, Mr. Fair assisted many railroads with their implementation and adherence with the regulations. Mr. Fair is deceased.

This Vegetation Management Plan was originally written for Conrail in 1989 by Environmental Consultants, Inc. (ECI). Mr. Paul A. Johnston was the Project Manager. Mr. Johnston had a B.S. in Forest Resources Management and a M.S. in Silviculture from West Virginia University. Mr. Frank DeVilbiss, Engineer of Vegetation Control for Conrail, assisted Mr. Johnston with preparation of the Plan. Both Mr. Johnston and Mr. DeVilbiss are deceased.

XIII. DEFINITIONS

Ballast: The rock that supports the track and ties. This rock is groomed to keep the track in place, drain water away from the track and distribute the weight of trains to surrounding soil.

Centerline of Track: An imaginary line, that runs down the center of the two rails of a track.

Culvert: A structure carrying water under a railroad that is designed to support the live load of railway traffic and dead load of the soil and track structure above. The live load becomes less of a factor as the depth of cover above the culvert increases, due to distribution of the live load through the soil. Bridges do not generally have an overburden of soil above the spanning elements.

Rail properties: Infrastructure within the "Rail ROW" that has a *demonstrable relationship to the function and operation of a railroad or rail transit system*, including but not limited to: rails and tracks, ties, ballast, rail beds, signal and communication systems, switches, overhead catenary systems, signage, traction power substations, passenger stations/depots and associated infrastructure and utilities, freight transfer facilities, boarding areas and platforms, boarding platform shelters and canopies, bridges, culverts, tunnels, ancillary facilities, ventilation structures, equipment maintenance and storage facilities, railyards, parking lots and structures, landscaping, passenger walkways, and

security and safety fencing.

Right-of-way: Land that the Railroad owns or owns an interest in that contains facilities for train operations. The Railroad and Rail Transit Rights-of-Way ("Rail ROW") includes the land and infrastructure that have been developed for existing or former intercity passenger rail, freight rail, rail transit operations, or that are maintained for the purpose of such operations. Rail ROW includes current and or former railroad or rail transit lines regardless of current ownership and whether there is rail service operation on the rail line. It includes property that was previously developed for railroad or rail transit use even though the infrastructure has been modified or removed, and the property may lack visual evidence of previous railroad or rail transit use. It does not include land that was never developed for railroad or rail transit use. **Rail ROW includes and may be identifiable by the presence of infrastructure that has a demonstrable relationship to the past or current function and operation of a railroad or rail transit system that commonly includes but is not limited to the rail properties⁴.**

Roadbed: The graded area beneath and on either side of the track.

Foul the Ballast: Anything that contaminates the ballast section of the roadbed and inhibits the ballast from supporting the track, draining water, or suppressing weed growth.

Foul the Track: Any obstruction that renders the track system unsafe for train passage.

Signal: A Railroad facility used to inform Railroad personnel of track conditions.

Splice: A point in the fiber optic system running line where cables are fused together to create a continuous system.

Spur Track: A secondary track designed to allow access to industries along the main track.

Switch: A moveable track device that allows trains to transfer from one track to another, encompassing the distance from the point of switch to the point of frog.

Tracks: The rails, ties and ballast and roadbed that compose the traveling surface used by trains.

Track Structure: The rails, ties, ballast, and roadbed that compose the traveling surface used by trains.

Trains: One or more engines coupled together, with or without cars that use the Railroad's tracks.

Train Movement: Any motion of engines and/or cars over the Railroad's tracks.

Trench: A narrow section of earth removed to allow installation of the fiber system.

Valuation Map: A Railroad map depicting the Railroad's facilities and engineering stationing.

Wet Bores: Are bores that use liquid to displace soil.

Yard: A collection of secondary tracks used to store equipment (cars, engines, maintenance machines, etc.), assemble or disassemble trains, and/or conduct other Railroad operations.

⁴ Source: Federal Register Vol. 84 No 125, ACHP Sec V (H)

APPENDIX A
MUNICIPALITIES AFFECTED BY THIS PLAN

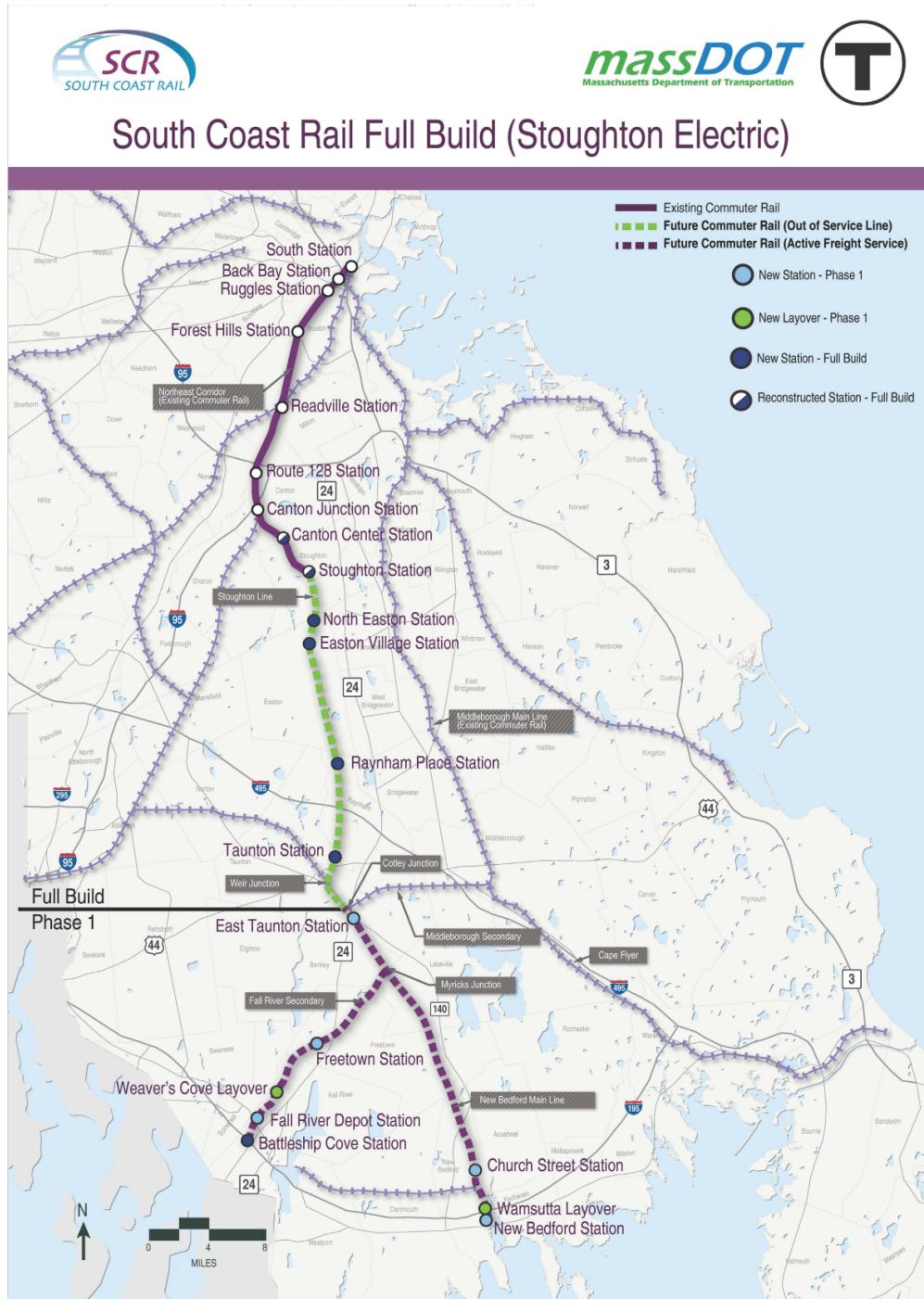
Abington	Dedham	Lawrence	Norfolk	Wakefield
Acton	E. Bridgewater	Leominster	North Andover	Walpole
Andover	Easton*	Lincoln	Norwood	Waltham
Ashland	Everett	Littleton	Plymouth	Wellesley
Avon	Fall River	Lowell	Plympton	Wenham
Ayer	Fitchburg	Lunenburg	Quincy	W. Bridgewater
Bellingham	Foxborough	Lynn	Randolph	Westborough
Belmont	Framingham	Malden	Raynham	Weston
Berkley	Franklin	Manchester	Reading	Westwood
Beverly	Freetown	Mansfield	Revere	Weymouth
Billerica	Gloucester	Medford	Rockport	Whitman
Boston	Grafton	Melrose	Rowley	Wilmington
Boxborough	Halifax	Middleborough	Salem	Winchester
Braintree	Hamilton	Milford	Saugus	Woburn
Bridgewater	Hanson	Millbury	Scituate	Worcester
Brockton	Haverhill	Milton	Shirley	
Brookline	Hingham	Natick	Somerville	
Cambridge	Holbrook	Needham	Southborough	
Canton	Hopedale	New Bedford	Stoughton	
Chelsea	Ipswich	Newbury	Swampscott	
Cohasset	Kingston	Newburyport	Taunton	
Concord	Lakeville	Newton	Tewksbury	

* Indicates South Coast Rail Project - Currently out of service

APPENDIX B KEOLIS SYSTEM MAPS



APPENDIX B KEOLIS SYSTEM MAPS



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APPENDIX E
**MASSACHUSETTS RIGHTS OF WAY
SENSITIVE AREA MATERIALS LIST**

MDAR

January 2025

Massachusetts Rights-of-Way Sensitive Area Materials List

List of Approved Herbicide Active Ingredients and Products

Active Ingredient Factsheets:

Aminopyralid	Sulfometuron Methyl
Glyphosate	Fosamine Ammonium Factsheet
Indaziflam	Triclopyr Factsheet
Imazapyr	Paclobutrazol Factsheet
Metsulfuron Methyl	

Products

Active Ingredient Use Restrictions	Product Names (EPA #) Registrant
Aminopyralid	Milestone (62719-519) (Product Review) Opensight (62719-597) (Product Review) Corteva Agriscience LLC'
Fosamine Ammonium Lowest Labeled Rate*	Krenite S (42750-247) Albaugh, Inc.
Glyphosate Lowest Labeled Rate for all Glyphosate products	Ranger Pro Herbicide (524-517) Round Up Pro (524-475) Bayer Cropscience LP

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Active Ingredient Use Restrictions	Product Names (EPA #) Registrant
	Glyphomax Plus (62719-322) Corteva Agriscience LLC
	Rodeo Corteva Agriscience LLC
	Aquaneat Aquatic Herbicide (228-365) Nu Farm Americas
	While Rodeo, and Aquaneat all have aquatic uses, approval for their use as sensitive materials does NOT mean that they can be used for aquatic weed control, or directly applied to water, as part of a rights of way management program. Products are subject to the no-spray and limited spray provisions of 333 CMR 11.04.
Imazapyr 3 pints/acre every 3rd year OR 2 pints/acre every other year for all Imazapyr Products	Arsenal (241-346) Arsenal Powerline (241-431) Polaris AC Complete Herbicide (228-570) (Product Review) Polaris Herbicide (228-534) Nu Farm Americas
Indaziflam	Esplanade 200 SC (432-1516) (Product Review) Bayer Environmental Sciences Esplanade 200 SC (101563-144) (Product Review) Envu, Environmental Sciences, U.S., LLC.
Metsulfuron Methyl Lowest Labeled Rate for all Metsulfuron Methyl Products*	Escort XP (432-1549) Bayer CropScience

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Active Ingredient Use Restrictions	Product Names (EPA #) Registrant
	<u>Escort XP (101563-167)</u> Envu, Environmental Sciences, U.S, LLC.
	<u>Patriot Selective Herbicide, (228-391)</u> Nu Farm Americas
<u>Metsulfuron Methyl</u> <u>Sulfometuron Methyl</u> Lowest Labeled Rate*	<u>Oust Extra (432-1557)</u> Bayer Environmental Science <u>Oust Extra, (101563-173)</u> Envu, Environmental Sciences, U.S, LLC.
<u>Paclobutrazol</u> Lowest Labeled Rate*	<u>Cambistat (74779-3)</u> Rainbow Tree care
<u>Sulfometuron Methyl</u> Lowest Labeled Rate for all Sulfometuron Methyl Products*	<u>Oust XP (432-1552)</u> Bayer CropScience <u>Oust XP (101563-168)</u> Envu, Environmental Sciences, U.S, LLC. <u>Spyder Selective Herbicide (228-408)</u> Nu Farm Americas
<u>Triclopyr, Butoxy Ethyl Ester</u> The lowest of the following rates: 1. Between 10 feet and 50 feet of the resource: Lowest labeled rate* or 0.5 pints per acre	<u>Garlon 4 (62719-40)</u> Corteva Agriscience LLC <u>Garlon 4 Ultra (62719-527)</u> Corteva Agriscience LLC

MDAR

January 2025

Active Ingredient Use Restrictions	Product Names (EPA #) Registrant
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2. Between 50 feet and the boundary of the limited spray zone: Lowest labeled rate* or 3 pints per acre

* **Lowest labeled rate** the minimum labeled rate of the pesticide product for the appropriate site, pest and application method

Disclaimer

The Massachusetts Department of Agricultural Resources (MDAR) makes no endorsement of any companies, organizations, persons, products, trade or brand names referenced in this Rights of Way Sensitive Area Materials List (“the list”). Active Ingredients on the list are reviewed pursuant to a Cooperative Agreement between MDAR and the Massachusetts Department of Environmental Protection. Only environmental fate and toxicological data, including eco-toxicological data, are reviewed when evaluating an active ingredients suitability for inclusion on the list. Inclusion on the list does not represent any endorsement by MDAR as to the efficacy of the active ingredient for rights-of-way vegetation management.

Contact for Rights of Way Sensitive Area Materials List:

Hotze Wijnja

Hotze.Wijnja@mass.gov

Phone: 857-972-4670

APPENDIX F BEST MANAGEMENT PRACTICES

Vegetation on rail rights-of-way (ROW) affects operations, maintenance activities and most importantly has a potential risk to the safety of passengers, employees, community, and the environment. As part of the commuter rail VMP, vegetation will be removed from the following areas:

- Ballast section (chemical only)
- Ballast shoulder (chemical and or mechanical)
- Yards (chemical and or mechanical)
- Switches, signals, and signs (chemical and or mechanical)
- Highway grade crossings (chemical and or mechanical)
- Bridges, abutments & buildings (chemical and or mechanical)
- Off-track areas (chemical and or mechanical)
- Inside of curves (chemical and or mechanical)

The VMP incorporates an *Integrated Vegetation Management* (IVM) approach that includes chemical and physical/mechanical controls for the reduction of vegetation hazards along the ROW that may:

- Become a **fire hazard** to track-carrying structures;
- **Obstruct visibility** of railroad signs and signals;
- Prevent railroad employees from conducting federally **required inspections**;
- **Interfere with railroad employees performing normal trackside duties**;
- Prevent **proper functioning of power, signal and communication lines**;
- Present a risk to the safe operation of trains;
- Along the right-of-way, and highway-rail crossings.

The Yearly Operating Plan (YOP) covers the permitted activities under the approved five-year VMP under the jurisdiction of the Massachusetts Department of Agricultural Resources (MDAR) in compliance with 333 CMR 11.00: M.G.L. c. 132B. The YOP is submitted for review and approval to MDAR at the beginning of every calendar year. The MDAR has 90 days upon receipt of the YOP to review and issue written approval. Upon receipt of the YOP, MDAR publishes a public notice in the Environmental Monitor and a 45-day public comment period begins. Concurrently, the YOP is communicated via certified mail to all communities included within the VMP. In addition, Keolis submits the previously approved maps included as part of the VMP to the National Heritage of Endangered Species Program for review.

The approved VMP and the YOPs can be found on the MDAR website. The YOP serves to inform communities on annually of activities planned for vegetation controls and may include the following:

- Chemical(s) to be applied pre-emergent spring and post-emergent/brush in late summer and early fall;
- Chemical (s) for Off-track brush control late summer and fall;
- Chemicals used for stem treatment throughout the year;
- Mechanical controls throughout the year;
- Roadbed drainage ditch vegetation clearing throughout the year.

CHEMICAL APPLICATION:

Chemical application is required to ensure railroad **roadbed** is clear of *all* vegetation. Areas adjacent to the roadbed, will be treated as needed and following the controls specified within the VMP and the approved zone maps for each community. Every year, the Environmental & Sustainability Department reviews the areas and conditions based on Keolis Engineering Department inspections, previous YOPs and areas of significant concern for prioritization of target vegetation for chemical application or mechanical controls. Keolis employs strategies for *selective application* of herbicides focusing on the methodology of spray to control target vegetation. In doing so, we reduce the application to non-target vegetation and protect the environment.

In addition, and to further reduce chemical application, Keolis has implemented best management practices to avoid “spray” of herbicides along the “roadbed” locations or other critical infrastructure along the ROW requiring full removal of vegetation, where:

- (1) Rail Tie replacement has been conducted within a period of 24 months.
- (2) Major construction requiring disturbance of ballast and or replacement of ballast has been completed within a period of 12 months.

Chemical application is planned according to the maps by line. In addition, Keolis only utilizes chemicals included within the approved MDAR ROW Sensitive Areas Material List.

Further, Keolis employs only certified/licensed applicators. The application of herbicide follows a review process that incorporates planning for reduction of herbicide application. This is done with the support of a Keolis trained Environmental Monitor who follows the maps and guides contractor to employ best management practices and monitor real time conditions. The herbicide is not applied:

- Near people;
- Near animals / livestock;
- Near agricultural areas;
- Onto active train platforms nor over nonrailroad fences;
- Onto nonrailroad property;
- Nonrailroad structures (Sheds, Tarps, garages, playgrounds, firewood piles, etc.);
- Landscaped areas;
- Well-kept shrubs;
- Branches of trees above 12 feet in height except for side trimming;
- If the following is observed in the field: free standing or moving water, wetland vegetation, people, animals, nonrailroad property, ground water supply areas, public/private wells;
- Near active, or soon to be active work areas.

Personnel applying herbicide are required to maintain daily records of application. Further, Keolis requires applicators to incorporate BMPs and the following:

- Drift control product to produce larger droplets to control drift to non-target areas.
- Monitor weather and wind speed direction to avoid drift of herbicide to non-designated areas (Nonrailroad property, sensitive areas, water, etc.)
- Weather conditions that may adversely affect the effectiveness of the herbicide. No application will be done during rain and or after heavy rain events. Dry conditions provide a more effective treatment of areas.
- Applicator will maintain a daily log to document conditions at the start/end of chemical application.

PHYSICAL AND MECHANICAL CONTROLS:

Keolis employs third party professional arborists and certified special services to conduct tree clearing activities. Keolis Engineering Department staff conduct general brush cutting and manual vegetation clearing as needed.

Keolis staff and contractors review video and GIS tools to assess key critical areas to target annually. Keolis best management practices for physical/mechanical methods include:

- Evaluation of statistical/historical conditions for target areas (derailments, slippery rail, incidents, inspections, etc.) to determine target vegetation;
- Survey - lines via hi-rail with contractor and Keolis engineers reviewing work with GPS-enabled video cameras;
- Drone use for evaluation of canopy over ROW;
- Evaluation of sensitive areas utilizing MapGIS;
- Evaluate VMP maps and identified No-Spray and Limited Spray Zones;

- Superintendents work in advance of crews to best determine property lines and assess tree characteristics and mitigation methods using GIS applications, physical markers, fences and Val maps to aid in property boundary determinations.
- Contractor arborists utilize tree hazards assessment techniques to target hazardous conditions and defected trees (ANSI A-300) standards, and invasive species identification;
- Regular track inspections to identify emerging hazards.

Mechanical cutting & trimming methods - Selective Vegetation Approach

- Tree cutting/removal is prescribed where trimming approach is insufficient or impracticable focusing on the safety and operational needs to ensure compliance with 40 CFR 237.
- Preference for trimming will be considered for sensitive resource areas when practicable.
- Tree work is performed utilizing aerial lifts and specialized tree equipment fitted with hi-rail gear for rail travel to avoid disturbance of sensitive resource areas. No land disturbance will be conducted while performing vegetation controls.
- Tree stumps are left at approximately between 6 to 12 inches to avoid soil disturbance.
- All chainsaws utilize environmentally friendly biodegradable bar and chain oil.
- Debris generated is either transported to an off-site location for a variety of recycling purposes, or it's chipped on site.
- Chips are broadcast within MBTA property limits on the shoulders of the corridor a minimum of 25ft from resource areas.
- Chippings will not be stockpiled more than 12 inches and whenever practicable they will be spread along ROW.
- Chippings need to be spread away from tracks and drainage ditches.

APPENDIX G
Specific Requirements from Previous Permits

1. Division of Fisheries & Wildlife, Permit No. 018-324.DFW
Special Conditions for Future Vegetation Management specific to Thatcher's Pond in Taunton:
 - a. In order to ensure long-term protection of State-listed species, mechanized vegetation maintenance (e.g., mowing) within Priority Habitat (according to the Massachusetts Natural Heritage Atlas) shall occur between November 1 and March 31 of each year.
 - b. In order to ensure long-term protection of State-listed plants, and for as long as the Permit Holder maintains active rail service associated with the Project, the Permit Holder shall monitor and control invasive plant species in the vicinity of Thatcher's Pond (Lakeville/Taunton municipal boundary) pursuant to the Invasive Species Management and Control Plan (Attachment 6) prepared by VHB, Inc. Said Plan shall be implemented by a qualified botanist approved in writing by the Division. If changes to said Plan are proposed, a revised Plan must be submitted to the Division for review and written approval prior to implementation of said changes.



Conservation and Management Plan

Revised 8/23/18

Attachment 6 – Invasive Species Management and Control Plan

MassDOT has developed this Invasive Species Management and Control Plan to provide long-term protection to the populations of the state-listed plant species (*Sabatia kennedyana*, Plymouth gentian, and *Eleocharis tricostata*, three-angled spike-rush) found in Thatcher's Pond (Priority Habitat 628) in Taunton, MA. As there are no permanent impacts, there are no requirements for measures to provide a long-term net benefit to these species.

Right-of-way maintenance is critical to the protection of the tracks and ties and to maintaining railroad safety. Right-of-way maintenance can only be done in accordance with an approved Vegetated Management Plan (VMP) and Yearly Operating Plan (YOP) that have been reviewed by the Massachusetts Department of Food and Agriculture (DFA) and made available for public comment. These management plans are developed in accordance with the DFA's regulations, which prohibit or restrict the application of herbicide in sensitive areas such as close proximity to wetlands and public or private drinking water supplies.

MassDOT has agreed to restrict the use of herbicides within the ROW adjacent to Thatcher's Pond (an area approximately 500 feet long, starting at the Lakeville/Taunton municipal boundary). This area will be marked "No Herbicide Application" using standard metal markers affixed to the ties. This specific location will be identified and shown on detailed project plans during the subsequent final design and permitting phase of the Project, when a VMP is developed. This designation and signage will prohibit the railroad operator from spraying herbicide from rail-mounted vehicles. Herbicide application by hand (using backpack sprayers) would be used as needed to remove vegetation and control invasive species within the right of way.

Invasive Species Monitoring and Control

At the completion of construction, the limit of the MassDOT right-of-way, on the south side, will be staked at 50-foot intervals. MassDOT will be responsible for controlling invasive species within the entire right-of-way. Where the railroad right-of-way includes wetland, invasive species control within the wetland will be by hand only (backpack sprayers may not be used) using a cut-and-swipe technique.

MassDOT or the railroad operator with responsibility for right-of-way maintenance will inspect this area annually for the presence of invasive species within the railroad ballasted area. The inspection will be done by a qualified botanist. The botanist will supervise any herbicide usage within this area. Invasive species include:

- *Phragmites australis*, common reed
- *Rhamnus frangula*, glossy buckthorn
- *Phalaris arundinacea*, reed canary grass
- *Fallopia japonica*, Japanese knotweed
- *Elaeagnus umbellata*, Autumn olive
- *Celastrus orbiculatus*, oriental bittersweet
- *Rosa multiflora*, multiflora rose

Invasive species will be controlled manually by pulling (autumn olive, oriental bittersweet, multiflora rose, glossy buckthorn) or herbicide application (common reed, reed canary grass, Japanese knotweed). Herbicide (glyphosate) will be applied manually using a backpack sprayer. The herbicide will be colored with a dye so that the applicator can ensure that only the invasive target plants are sprayed. Where it is necessary to treat invasive species within the wetland, treatment will be by hand only (backpack sprayers may not be used) using a cut-and-swipe technique.

Annual Monitoring Report

MassDOT will prepare and submit to NHESP, by December 15 of each calendar year, an annual report. The report shall contain:

- The date of inspection
- The name and qualifications of the botanist
- An assessment of invasive species within the right-of-way, including the species, size of the invasive species population, location of the population (within ballast, within wooded areas, within the wetland)
- A description of treatment used (manual, herbicide treatment).