



Invasive Plant Management Strategy New Library Construction Site Shutesbury, Massachusetts

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CONTRACTOR INFORMATION

Company & Staff: Ecological Land Management, LLC

Ecological Land Management, LLC (ELM), is an ecological restoration oriented company, with a focus on the management of I.D.E.S. (Introduced, Disruptive Ecologically, & Successful) species, making transportation infrastructure more resilient to climate change, and restoring wetland and riparian areas. Specialties include research on and management of I.D.E.S. knotweeds; interacting with the Massachusetts Wetlands Protection Act and related municipal wetland bylaws; and botanical education.

ELM's Principal, Brian Colleran is a Professional Wetland Scientist (PWS) and Certified Ecological Restoration Practitioner (CERP), possesses both the basic and advanced Field Botany certificates awarded by the Native Plant Trust for whom he now serves as an educator, is a graduate of the Massachusetts Association of Conservation Commission's (MACC) Fundamentals program, has been trained as an A-level sawyer by the U.S. Forest Service, has a Commercial Pesticide License in the Commonwealth of Massachusetts in Category 40 (Rights-of-Way) and passed herbicide applicator tests in two other states, and has been involved with four Conservation Commissions here in the Commonwealth, including as an Agent and a Chair. He has a long history in fluvial, riparian, and wetland projects; invasive species control work, and the regulation and management of natural areas. He has conducted a 100,000 dollar revegetation project along California's San Joaquin River on time and under budget, been involved with controlled burns and fen restoration in Michigan, fuels management and reforestation in Nevada's High Sierra, desert restoration in Arizona, and led statewide efforts to control the spread of invasive knotweed in the wake of Tropical Storm Irene in Vermont. He recently completed service as an outside advisor to a University of New Hampshire master's students whose thesis is titled: "Investigation into Itadori knotweed as a Control of Bank Erosion in New Hampshire Rivers". This project was prompted by a publication Mr. Colleran served as lead author on in 2020: Invasive Japanese knotweed (*Reynoutria japonica* Houtt.) and related knotweeds as catalysts for streambank erosion. *River Research & Applications* 36(9):1962-1969. He is the Founder of, and a Principal with, Ecological Land Management, where he continues to investigate the scope and scale of the impact to transportation and riparian systems inflicted by the swarm of invasive knotweed species and sub-species.

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PROJECT INFORMATION

Ecological Land Management, LLC has been contracted to provide an Invasive Species Management Plan for the site of the future Library Building, 66 Leverett Road, Shutesbury, MA to fulfill Special Condition 124 in the Order of Conditions (OOC) issued by the Shutesbury Conservation Commission (SSC) on February 16, 2024 which was assigned DEP File #: 296-0304. As stated in Special Condition #14, this plan includes:

- A map of the area to be managed
- A list of species found within the mapped area
- A description of the invasive species removal methods to be used
- Who will be implementing the plan
- A schedule of treatment frequency

Date of site walk:

A site walk was conducted on Tuesday May 7th, 2024.

Attendees at site walk:

At the site walk, Brian Colleran was present to represent ELM. Penny Jaques was present to serve in an advisory role to Mary Anne Antonellis, Director of the M.N. Spear Memorial Library.

SITE CONDITIONS AND GENERAL GOALS

From an invasive species perspective, the woods and wetlands comprising the library's new home are in good shape. Mindful stewardship will ensure that these lands will remain so for a long time into the future. The goal of this IPMS therefore is to maintain that ecological health in the most efficient long term manner, while also creating opportunities for community engagement and education. Therefore, volunteer management of the property will be a keystone aspect of any and all future invasive species control work.

The relative lack of invasive plants was due to the fact that most of the vegetation beyond the project footprint consisted of minimally disturbed forests. As this project continues, is completed, and the library settles into its new rhythms, areas that were formerly undisturbed must be watched for the introduction and/or establishment of invasive species, where they formerly would not have had the opportunity for establishment. The constant flow of traffic, both shoes and tires, ensures that a constant stream of vectors for the dispersal of invasive seeds is guaranteed for the property long into the future. Therefore, regular efforts to prevent the establishment and expansion of invasive species population will need to be carried out once or twice a year. Such a relatively light

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workload ensures that volunteers can see the fruits of their labors, and their work can effectively defend the property from the encroachment of ecologically detrimental invasive species.

The only observed invasive plant within the project footprint with a major presence was *Celastrus orbiculatus* (bittersweet), primarily alongside the road, and within the wetland meadow adjacent to the stone wall in the wetland demarcated as BVW-1, and which continues to the eastern property line. There was also a notable population of *Rosa multiflora* (invasive rose). This was primarily found in the vicinity of the *C. orbiculatus*, with scattered individuals in the grassy portion of the BVW-1 wetland, slightly upslope from the *C. orbiculatus*. Other species located during the site walk included three individual *Eunymus alatus* (burning bush) along the eastern edge of the property, a seemingly lone *Berberis thunbergii* (barberry) along the western edge of the property, as well as *Reynoutria japonica* (Itadori knotweed). While buckthorns and honeysuckles were expected to be present, none were observed at the time of the site walk.

The most difficult invasive plant to treat on site is the *Reynoutria japonica* (Itadori knotweed), which was located on the roadside edge, and growing in the stone wall. Adaptive management is generally required for any success to be expected with the control of this plant. Luckily, every single stand of this plant can be treated as an “Early Detection and Rapid Response” opportunity. New plants come from pieces of existing plants by a wide margin, and while genetic complexity is present in invasive knotweed populations, it is still an invasive seemingly constrained to transit corridors, such as roadways, waterways, and railways. This plant is difficult to control, regardless of the techniques used. The goal for all stands of *R. japonica* is eradication, to make sure that it does not spread nor impact the nearby wetlands.

With some herbaceous invasive flora not being readily identifiable at this time of year, the presence of species that may require special consideration cannot be ruled out, such as black swallowwort (*Vincetoxicum nigrum*). If and when species that could not be observed during the site visit are found to be present on the site, such as *V. nigrum*, the Library Director and the Conservation Commission shall be notified, and any required changes/amendments to this IPMS shall be made as needed.

COORDINATION WITH LIBRARY DIRECTOR REGARDING OTHER WORK

It is not currently expected that any of the work on the new Library will need to be coordinated with the work of invasive species control.

VOLUNTEER MANAGEMENT OF INVASIVE PLANTS

The low numbers of both species and individuals on the site makes volunteer management of invasive plants on this site a viable strategy. Keeping in mind that certain adaptations may be needed as site conditions and personnel change, the following outline is expected to provide sufficient guidance for a volunteer management effort

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1. The library director shall maintain a list of invasive species on the property, which this IPMS shall begin
2. Volunteers will be provided with the materials needed to learn how to identify the invasive species present on site
 - a. Volunteers shall also be provided with an in-person educational opportunity to learn how to identify and control invasive plants
3. During the last weekend of June, an advertised work party shall be held on the grounds of the new library. The work shall be conducted within sight of the library, with no attempts made by volunteers to penetrate into the woodlands.
4. Volunteers shall be broken up into teams of three, equipped with a trash bag, shovel and/or other tools sufficient for the task of separating invasive plants from the ground, and identification tools sufficient for their needs, as well as appropriate personal protective equipment, such as gloves
5. The property shall be searched for invasive species. In this case, the property shall consist of the field, as well as the woodland edges immediately adjacent to the field.
6. All plant material shall be placed in the trash bags. Prior to the removal of any plant material from the ground, each plant will be inspected closely to make sure no invasive seeds are present, which might be accidentally left behind or distributed during control work. These seeds shall be prioritized for removal before the plant is removed from the ground.

This basic outline should be sufficient for this property. During these workdays, more experienced naturalists may be engaged in looking further afield than other volunteers, to seek out individual plants that may be in difficult to reach locations, or to find invasive species that are new to the property.

INVASIVE PLANT TREATMENT AND MANAGEMENT

Proposed chemical and methods of treatment for each species or area:

The main focus of proposed chemical usage is *R. japonica*. For the duration of this plan, the proposed method of chemical treatment of *R. japonica* in the second half of the year is the use of a backpack sprayer, with a 3-5% concentration of glyphosate, and a 1-3% concentration of Agri-Dex surfactant. The same mixture is appropriate for many other woody species and shall be used to treat other species at the same time, unless site or species specific considerations demand otherwise. In this case, it is expected that this herbicide treatment for non-*R. japonica* species will only take place during the early August knotweed treatment. The early August of 2024 treatment, when herbicide treatment will initiate, is expected to kill about 90% of the knotweed plant(s) treated. Should unimpacted portions of the plant's rhizomes show sufficient signs of recovering by growing new stems, a third treatment in early October will also be carried out in 2024. This same process will be repeated in subsequent years. Any spring treatments, from 2025 onward, will use a 2% concentration of glyphosate, followed by the same two-step treatment regime in Early August as well as Early

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October. This methodology is meant to target the changes in metabolic sinks as knotweed progresses through its phenological changes for the growing season. New spring growth in the rhizomes is targeted by the Late May/early June treatments, overwintering buds are targeted by the August treatment, and untreated overwintering buds which escaped the initial August treatment are treated again in October. This ensures that treatment of the whole rhizome system is conducted in a single calendar year, when most herbicide treatments currently only recommend a single treatment, which ensures some portion of the rhizome system is left to regrow the following spring.

For other species, as alluded to in the introduction, none that require special attention are currently known. Spraying the plants in the vicinity of the stone wall / within BVW-1 just once should bring that population down to the level where volunteer workday could finish the job, and maintain their success. Currently, the numbers of plants (*C. orbiculatus* & *R. multiflora*) are just too high to make for an effective volunteer work day, and with trampling, soil disturbances, etc. especially in the wetland itself, such a strategy might well result in damage to the overall wetland that would be more significant than any accidental non-target applications to native flora.

The final chemical treatment is proposed for October, 2026.

Possible, & not recommend, non-chemical methods of treatment for R. japonica:

Knotweed may be dug out by hand. However, a useful shorthand developed by a group in Vermont is that *the number of years the knotweed has been present* is a good expectation for the number of years that will be necessary for non-chemical management to be conducted.

Tarping may also be pursued, but that is a methodology that requires constant upkeep, and does not have a clear timeline associated with it. Additionally, the roadside edge, subject to so many disturbances, is an unlikely location for success to take place, as the tarp must be maintained in a near perfect condition and seems like an unrealistic requirement of the roadside edge.

Time of treatment based on target plant species:

R. japonica (Knotweed): There are two windows in the course of the growing season that are most effective for the chemical treatment of invasive knotweeds. The first is in the late Spring/Early Summer. This is a relatively new timing methodology, and the timing window is still unclear. What is clear is that the portions of the rhizomes impacted by this spring treatment are different than those impacted in the more traditional treatment window, which runs from roughly late August to the middle of October. Visits to the site to chemically treat knotweeds would therefore be conducted in both treatment windows as weather and other project needs require and allow for. For 2024, the initial treatment will be scheduled for early August, following the Conservation Commission's approval of this plan. Current field experience shows that portions of the plant not killed in this August treatment often resprout in time for a third treatment of the same stand in the same year to

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be possible. Should this opportunity present itself, it will be taken advantage of, likely in early October.

All other species: Spraying of all other species shall be conducted during the early August treatment of *R. japonica*, in August of 2024.

If and when species that could not be observed during the site visit are found to be present on the site, the Library Director and Conservation Commission shall be notified, and any required changes/amendments to this IPMS shall be made as needed, including but not limited to species-specific treatment timing.

Time of treatment based on target plant location:

Some plants may be found within the wetlands on site. In cases where high water exists, neither volunteer labor nor herbicide spray is low impact enough. Removal by tools will disturb the soil too much, and damage sensitive locations. Similarly, glyphosate is especially dangerous to amphibians. Preventing their exposure to this chemical, as well as others in an herbicide mixture is of vital importance. Therefore, it is proposed that for any such woody species found growing in a sensitive section of wetland, a winter cut stump methodology is utilized. The frozen ground allows for foot traffic which won't damage the environment, and herbicides applied to a cut stump in the dormant season still accomplish their goal, without introducing any herbicide into the surrounding waters. The potential risks are therefore minimized, while ensuring that the damage to the ecosystem that would inevitably be caused by the expansion of a population of invasive species is prevented.

Product label including application methods and rates:

Please see below for expected herbicide and surfactant trade names, and the links to their product labels and safety data sheets. An AquaNeat and Agri-Dex combination is the only solution being proposed as it is currently the most water-safe option for chemical control of invasive species. The glyphosate formulation chosen was picked due to its lack of adjuvants, which are the source of many of the toxicity issues associated with herbicide application. By removing all other chemicals from the solution, the toxicity of the herbicide solution to non-target organisms can be more effectively reduced. Application rates for these products will be 3-5% concentrations of glyphosate, and a 1-3% concentration of Agri-Dex surfactant, except in the case of the Spring knotweed treatments, which will be a 2% concentration of glyphosate.

Aquaneat Aquatic Herbicide (MDAR maintains this glyphosate formulation as approved for use in [Sensitive Areas within Right of Ways](#)):

[Product Label](#) & [Safety Data Sheet](#)

Agri-Dex Non Ionic Surfactant:

[Product Label](#) & [Safety Data Sheet](#)

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Proposed performance metrics:

The measure of success for the knotweed patches would be to have eliminated all the visible knotweed on site noted during the initial site walk. It is expected that some “bonsai” forms of knotweed will emerge adjacent to the footprint of one or some of the current knotweed patch(es), even as early as spring of 2025. The potential for successful elimination of all knotweed stands is dependent upon state and/or local agencies being prepared to continue management efforts of these deformed plants, which can no longer be treated with herbicide. The greatest measure of treatment success would be the job being small enough that another agency would take responsibility for continued knotweed management at this location willingly.

For all other species found on site during the course of this project, the proposed performance metric would be to have no untreated individuals on site at the time of the final knotweed treatment/inspection.

Method for disposing of invasive plant material:

All chemically treated plant material, *R. japonica* or otherwise, will remain where they are treated, and self-compost.

Disposal of waste generated by volunteer work days will be stockpiled for burning, hung up in nearby vegetation for drying and composting on site, or placed into the regular trash, for inclusion in the regular waste stream. The primary concern for these wastes is making sure that no seeds are spread. Any seeds found during these workdays should be promptly clipped and placed in a trash bag for disposal in the regular waste stream.

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Outline / Summary of Invasive Species Management Actions & Timeline

<u>Action(s)</u>	<u>Species</u>	<u>Responsible Party/ies</u>	<u>Time Frame</u>
Volunteer Workday	<i>Non- R. japonica / Knotweed</i>	Library Director	June 2024
Apply Herbicide Spray	<i>R. japonica / Knotweed, + invasive bittersweet & rose</i>	Ecological Land Management, LLC	Early August 2024
If Possible, Apply Herbicide Spray	<i>R. japonica / Knotweed</i>	Ecological Land Management, LLC	Early October 2024
Apply Herbicide Spray	<i>R. japonica / Knotweed</i>	Ecological Land Management, LLC	Late May/Early June 2025
Volunteer Workday	<i>Non- R. japonica / Knotweed</i>	Library Director	June 2025
Apply Herbicide Spray	<i>R. japonica / Knotweed</i>	Ecological Land Management, LLC	Early August 2025
If Possible, Apply Herbicide Spray	<i>R. japonica / Knotweed</i>	Ecological Land Management, LLC	Early October 2025
Apply Herbicide Spray	<i>R. japonica / Knotweed</i>	Ecological Land Management, LLC	Late May/Early June 2026
Volunteer Workday	<i>Non- R. japonica / Knotweed</i>	Library Director	June 2026
Apply Herbicide Spray.	<i>R. japonica / Knotweed</i>	Ecological Land Management, LLC	Early August 2026
Apply Herbicide Spray. Final Treatment under current end of contract date.	<i>R. japonica / Knotweed</i>	Ecological Land Management, LLC	Early Autumn/ Early October 2026



Appendix 1: Site Visit Photos

Image 1 (5.7.24): Knotweed along roadway, circled in blue. This circled area is where herbicide use is being requested.



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Image 2 (5.7.24): Knotweed along roadway, circled in blue. This circled area is where herbicide use is being requested.



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Image 3 (5.7.24): Invasive bittersweet dominating the open field, primarily between the blue line and the stone wall. The area circled in red is the same area circled in red in the next picture. This area outlined in blue is where herbicide use is being requested.



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Image 4 (5.7.24): Invasive bittersweet dominating the open field, in close proximity to the stone wall. The area circled in red is the same area circled in red in the previous picture. This circled offers a closer view of a section of the area where herbicide use is being requested.

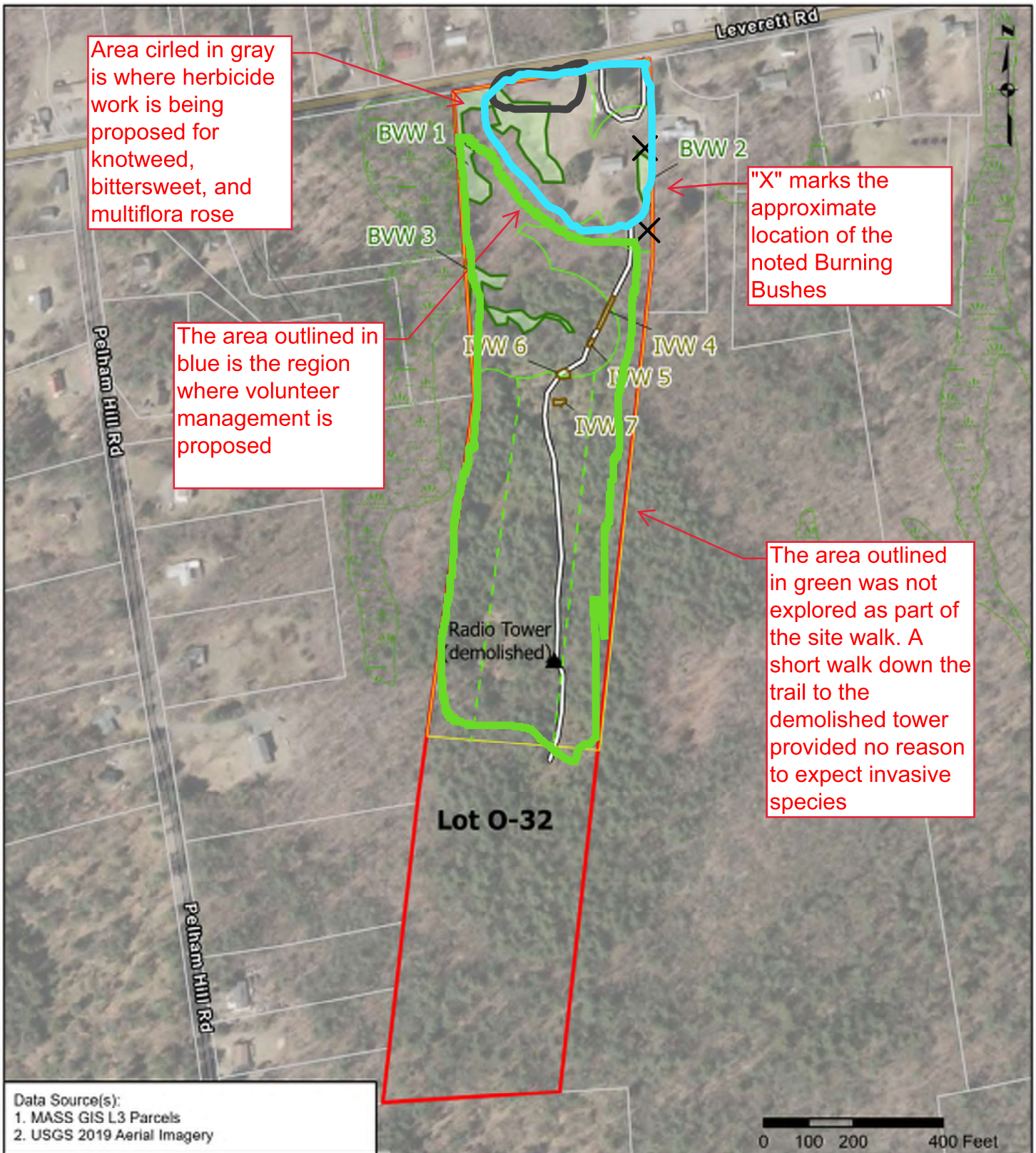


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Proposed Management Actions for the Control of Invasive Species, Freehand Drawing



- Subject Parcel
- ANRAD Review Area
- Parcel Boundary
- BVW Boundary (Delineated)
- IWV Boundary (Delineated: Not Jurisdictional)
- Wetland Area
- 100-ft Buffer Zone
- No-Contest Buffer Zone
- MassDEP Mapped Wetland
- Access

Notes:
 Wetland Delineation conducted by Fuss & O'Neill on August 5 and 15, November 13 and 16, 2022.
 Wetland flag locations located by Harold L. Eaton & Associates, Inc., Massachusetts PLS #25002.
 The No-Contest Buffer Zone extends 200 feet from the subject parcel boundary.

Wetland Delineation Overview
 66 Leverett Road
 Shutesbury, Massachusetts
 February 2023 (last revised)

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Figure 2