Community Preservation Committee

Littleton, Massachusetts

The CPC was established by Town Meeting in 2007. The CPC has the powers and responsibilities specified by Massachusetts General Law Chapter 44B, section 5(b), the Community Preservation Act.

Community Preservation Application for Funding

Date: January 14, 2025

Project Title: Eco-Harvesting of Invasive Aquatic Plants in Lake Matawanakee

Name of Applicant: Jonathan Folsom, Clean Lakes Committee Chair

Name of Organization: Littleton Clean Lakes Committee

Address: c/o Littleton Water Department, 39 Ayer Rd, Littleton MA 10460

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CPA Category (circle all that apply): **Open Space** **Historic Preservation** **Recreation** **Community Housing**

CPA Funding Requested: $ 80,000.00 **Total Project Cost**: $ 98,500.00

Please attach answers to the following questions. Include supporting materials as necessary.

1. **Project Description:** Please give a detailed project description, including specific objectives.
2. **Goals:** How does this project accomplish the goals of the Community Preservation Plan for Littleton? (See Guidelines for Project Submission for general criteria.)
3. **Timeline**: What is the schedule for project implementation, including a timeline for all critical milestones? Will this be a multi-year project?

4. **Budget**: Please provide a full budget including the following information, as applicable. (NOTE: CPA funds may not be used for maintenance):
    a. Total amount of the project cost, with itemization of major components.
    b. Additional funding sources. Please include those that are available, committed, or under consideration.
    c. Describe the basis for your budget and the sources of information you used.
5. **Support:** Have the appropriate Town Boards and Commissions expressed support and/or approved the project? What is the nature and level of community support for this project?

Submit this form and accompanying materials to:

Community Preservation
Committee c/o Town Clerk
Office Town Offices
37 Shattuck Street
P.O. Box 1305
Littleton, MA 01460
978-540-2401
townclerk@littletonma.org

Please provide one paper copy as well as an electronic (pdf) file.

1. Project Description

Central Focus

The project will serve two purposes. First, it will answer this question: Is using Eco-Harvesters to remove invasive plants a cost-effective contribution to mitigating the eutrophication[1] of Lake Matawanakee? Second, it will remove a significant amount of invasive plant material from Lake Matawanakee. This will be the first true instance of a new treatment to deal with the burgeoning invasive plant growth and accelerated eutrophication of the lake.

We have tried Eco-Harvesting in two previous seasons. Results have been inconclusive because, due to practical and administrative constraints, we weren't able to do enough harvesting early enough in the season for a viable test of the method.

Background

For several decades, the growth of invasive plants[2] in Lake Matawanakee has been countered by winter drawdowns of the lake, which impair plant reproduction by freezing the exposed lakebed. Recent winters have been warmer, significantly reducing the effectiveness of drawdowns. The warmer weather has made it difficult to lower the lake level to the target elevation and has prevented achieving the two-week period of sub-freezing temperature needed to successfully eliminate the invasive plants. In the last two years the population of invasive plants has surged. We urgently seek additional methods for controlling invasive aquatic plants.

Over the past two summers we have tried a relatively new way of mitigating the invasive plants: Eco-Harvesting. This method collects the plants using a harvesting machine on a platform boat that engages the plants in the first few feet below the water surface and removes them into a hopper by wrapping the plants with continuously rotating rollers and a conveyor belt. Ideally, the full length of the plants can be removed. The plants are disposed of away from the lake. In both summers, constraints in the treatments gave us inconclusive results. The treatments were too limited in scale and, because of permitting delays, took place too late in the summer. We are working to timely obtain a DEP permit for future treatments that will effectively have no limit on the amount of plant material to be removed. Having a more complete test of the method next summer, with a larger and earlier treatment, will allow the effectiveness of the process to finally be adequately assessed. If it is successful, this method may become an important means to deal with accelerated eutrophication.

Specific Objectives

Remove enough invasive plant mass in the first half of the season to create an observable change in the distribution of those plants in the remainder of the present season and the early part of the following season.

[1] "Eutrophic" means "supporting life." Eutrophication is the natural process by which lakes fill in with sediment and plants and, over long time periods, become first swamps, then meadows.

[2] Invasive plants in Forge Pond / Lake Matawanakee include fanwort, Eurasian milfoil, variable milfoil, curly-leaf pondweed, and European naiad. These species impair recreational uses of the lake and degrade the habitat of the lake's littoral zone (the area of rooted plant growth) by out-competing beneficial native species. This degrades the viability of the entire water body for all life on and in the lake.

Assess invasive plant distribution and density before and after the Eco-Harvesting, and again early in the subsequent season, to determine if the Eco-Harvesting was usefully effective in reducing plant proliferation.

Assessment Method

Determining the mass of invasive plants in the lake is a difficult process. The professional surveys hired annually for many years by both Westford and Littleton are observational and somewhat subjective, describing the species found, the lake areas included, and (very approximately) the prevalence or density of the plants. We will rely on such professional surveys again in this project, as we have before.

In addition, we will perform and record our own observations at more frequent times throughout the season and over the following season. Primarily, there will be determination of where invasive plants exist and where they don't. Practically, to assess the large overall area of the lake, this will be done by visual observation. The height of the plants, dark color of the water and both the amount and reflectiveness of sunlight on the water surface can affect the ability to view plants. A sampling hook secured on a rope will be used to collect plant samples from near or at the lake bottom in areas where this is appropriate, but it is a time-consuming process and can't be used over the entire area of the lake. Secondarily, where invasive plants exist, the density of the plant growth will be subjectively be observed.

Initially, there will be a determination of the extent to which the Eco-Harvesting was able to remove plant material in all of the areas where it was used. It is possible that the effectiveness of removal will vary with different conditions, e.g., the water depth, the predominant species of plant in the area, and density of plant growth. The initial effectiveness may also be dependent on the amount of time the Eco-Harvesting was operated in a given area and the manner in which the machine was operated, when such characteristics are known.

The initial removal of plant material is useful in preventing the plant mass from eventually falling to the lake bottom and adding to the sediment there, which slowly fills up the lake. The treatments will be even more useful if they have a lasting effect on the plant growth, reducing the regrowth of invasives in the areas treated. One of the claims for Eco-Harvesting is that plant growth is reduced with each treatment, so that after a sequence of several treatments, plant growth has dropped to a lower level which may be acceptable and it may be some period of time before treatments are needed again.

So, an additional measure of success will be the extent to which the reduction in plant growth is long-lasting. To what extent do the reductions remain effective through the remainder of the summer, into the next spring and through the next summer? Repeated assessments of the level of invasive plants will be performed to determine this.

2. Goals

The immediate goal of this year's effort is to determine if Eco-Harvesting is an effective tool for mitigating the spread of invasive plant species in the lake.

The overall goal of this effort is to preserve the quality of the lake in the face of accelerating eutrophication. This aligns with the CPC mission of open space preservation. Littleton's lakes

are a treasured natural resource, but when lakes are surrounded by developed communities they are prone to accelerated eutrophication and deterioration. This has been seen locally at Mill Pond, which over just a few decades changed from being a vibrant lake with a 12-foot depth to a degraded pond with a 3-foot depth. It once had six lovely lake basins that are now just marsh at best. Managing the ecology of the lakes is important for preserving their vitality.

If we fail to halt the spread of invasive plants, the ecology of Lake Matawanakee will continue to deteriorate and the lake will fill in, become a swamp and, later, a meadow. This process takes thousands of years under natural conditions. But it occurs in tens to hundreds of years when stimulated by human habitation. Intensive human activity has been fostering eutrophication in Forge Pond and Lake Matawanakee for nearly 100 years now, and the process is advancing rapidly.

The lake ecology declines as invasive plant species — which grow more aggressively than native plants — increasingly crowd out the native plants. The originally-diverse ecology becomes a near-monoculture of just a few plant types, which do not support the diversity of other life in the lake. Fish, turtles, frogs, mussels, … the entire array of life in the lake narrows to just a few that can survive in the limited environment. The open space becomes an ecologically collapsed quagmire. Community Preservation funds aim to preserve open space; that is our primary goal.

Eco-Harvesting is a relatively new technique of removing plant biomass from the lake. This contrasts with herbicides, which kill the plants and leave the dead biomass in the lake. The toxicity of the herbicides quickly dissipates, and the decaying biomass adds to the sediment in the lake bottom and becomes a fertile substrate in which more plants take root. Eco-Harvesting is more costly, but has the great advantage of removing the undesired plant mass.

3. Timeline

Project Plan

It is planned that CPC funds requested here will be spent in the summer of 2025 unless a step below is materially delayed. The final assessment of Eco-Harvesting cost-effectiveness will be completed by Clean Lakes Committee members (therefore at no cost) in early summer of the following year, when re-emergence of invasive plants is sufficient to support evaluation of the previous season's work.

Project milestones are:

January 2025 - Initiate application for Massachusetts Department of Environmental Protection (DEP) permit allowing removal of 5,000 cubic yards of material.

Late May/ early June 2025 - Conduct pre-treatment survey of invasive plants

June 2025 - Receive DEP permit

June 2025 - Begin Eco-Harvesting operation

June/July 2025 - Complete Eco-Harvesting operation

July, August, September 2025 - Conduct post-treatment survey of invasive plants

May/June & August 2026 - Conduct second-season surveys of invasive plants

September 2026 - Complete evaluation of Eco-Harvesting effectiveness

Potential Delays

Of the steps listed above, the one most likely to incur delay is receiving the DEP permit. Administrative delays in the issuance of permits have bedeviled our efforts in previous years. If that occurs this time, we will not proceed with Eco-Harvesting late in the season, as we have been forced to do before, as we recognize that early treatments are more effective. Instead, we will preserve the funds to perform the work and evaluation in the subsequent season. In this case, we will consider more traditional alternatives for the 2025 season. This could potentially include a single-time use of herbicides after consultation with lake management professionals on the advisability of this approach, ahead of Eco-Harvesting. If the 2025 invasive plant growth continues to increase, as it has in the last two years, it may be wise to dampen that increase with a herbicide treatment until we can further assess better options.

4. Budget

Requested CPA Funds

We request $80,000 of funding from the Open Space CPA Category.

Additional Funding Sources

We have $18,500 of remaining[3] FY2025 funding from the Littleton Water Department which we plan to use in June 2025.

Basis of Budget Estimate

Project total cost is $98,500, as follows:

$6,000 – Professional plant surveys to determine plant populations before and after the treatment

$92,500 - Eco-Harvesting operations. This figure is an estimate based on:

$6,000 per machine-day, based on actual costs in the previous season with a small allowance (< 10%) for inflation and bidding contingencies.

15 machine-days for the Eco-Harvesting units, which is expected to allow an adequate assessment of the effectiveness of Eco-Harvesting treatments. This is 5 times the Eco-Harvesting work performed on the Littleton portion of Lake Matawanakee during the 2024 season. This is the estimated treatment level which would make a readily-observable reduction in the amount of invasive plants growing in the lake. It is considerably more than was performed last season, but the 2024 treatment was woefully inadequate for the level of invasive plant growth in Lake Matawanakee.

The cost per machine-day includes:

- Operation of the Eco-Harvester

[3] Eco-Harvesting in previous seasons was conducted under a DEP permit that capped the volume of plant material removed. We reached that limit before all authorized funds were incurred, leaving an unused balance.

- Off-loading removed plants into trailers
- Transport removed plants to composting facility
- $10/cubic yard fee at the composting facility
- An allocation of the non-recurring cost to transport the equipment to/from the operator's base in Connecticut.

It is difficult to accurately predict how much it will cost to do the planned Eco-Harvesting because the productivity of the process varies substantially with the density of the plants. That density varies season to season, and the main basis for predicting next season's density is the trend of recent seasons. In addition, the work must be bid out to potential contractors and the bidding result is uncertain. The figures here are our best estimates based on statements by the Eco-Harvester operator from the past two seasons and our actual cost in the previous season.

The Westford Factor

In the past, Littleton and Westford have jointly funded the management of Lake Matawanakee's (and Forge Pond's) ecosystem. This has included annual monitoring of the plant populations and water quality, dredging of the outlet channel to improve winter drawdowns, and the past Eco-Harvesting treatments. Starting in FY2026, however, it seems that Westford will not be providing funding for Eco-Harvesting treatments. It is hoped that in the future, Westford will once again be providing financial support for lake management activities such as Eco-Harvesting and structural projects to increase drawdown effectiveness.

In the meantime, however, when Littleton is funding Eco-Harvesting and Westford isn't, it is planned that the Eco-Harvesting operations will be performed only on the Littleton portion of Lake Matawanakee. Performing Eco-Harvesting on half the lake will still allow an assessment of the treatment effectiveness. Meeting the larger goal of mitigating accelerated eutrophication, of course, will require shared future funding for treatments for the whole lake.

5. Support

There is broad support in the Littleton for management of the town's lake ecosystems, including treatments such as Eco-Harvesting. Evidence of this support is the special session of town agencies called by the Town Manager in August 2024 to address the state of the lakes and the current state of funding for managing their ecosystems. The session was attended by members of the Select Board, Finance Committee, Water Department, Conservation Commission, Parks and Recreation Commission, Community Preservation Committee, and Clean Lakes Committee. These groups acknowledged the importance of preserving the quality of Littleton's lakes and agreed to work together to develop strategies for funding needed lake management activities.

In addition to funding from the Community Preservation Committee, lake management activities are currently funded by the Littleton Water Department. Discussions are underway to receive additional funding from the Select Board and the Parks and Recreation Commission.

The Conservation Commission's support for these activities is demonstrated by its approval of permits for them under the Wetland Protection Act.

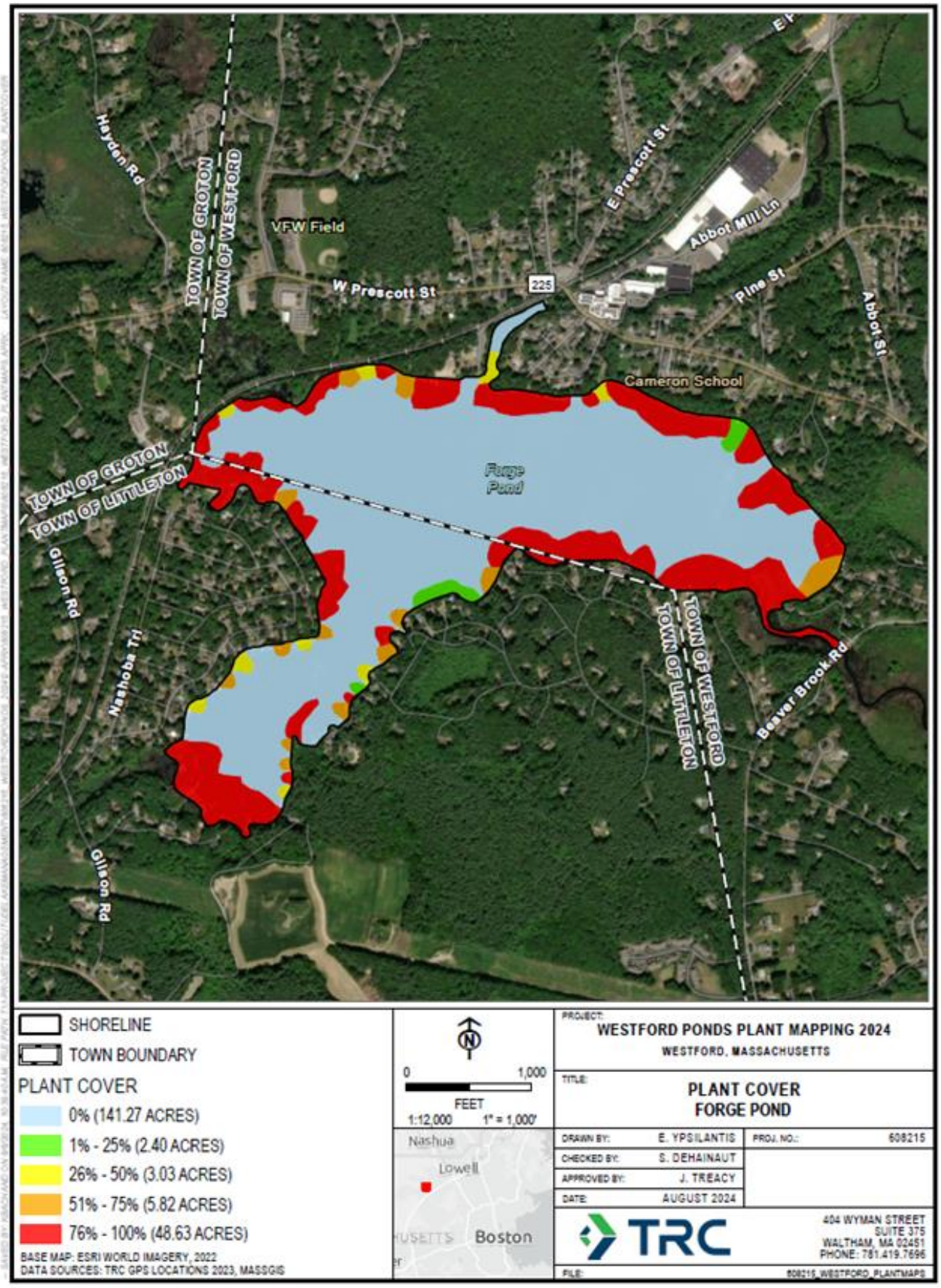

Figure 1. Plant cover on Lake Matawanakee / Forge Pond (Summer 2024)
Map doesn't show the significant plant coverage in the deeper water of the south bay.

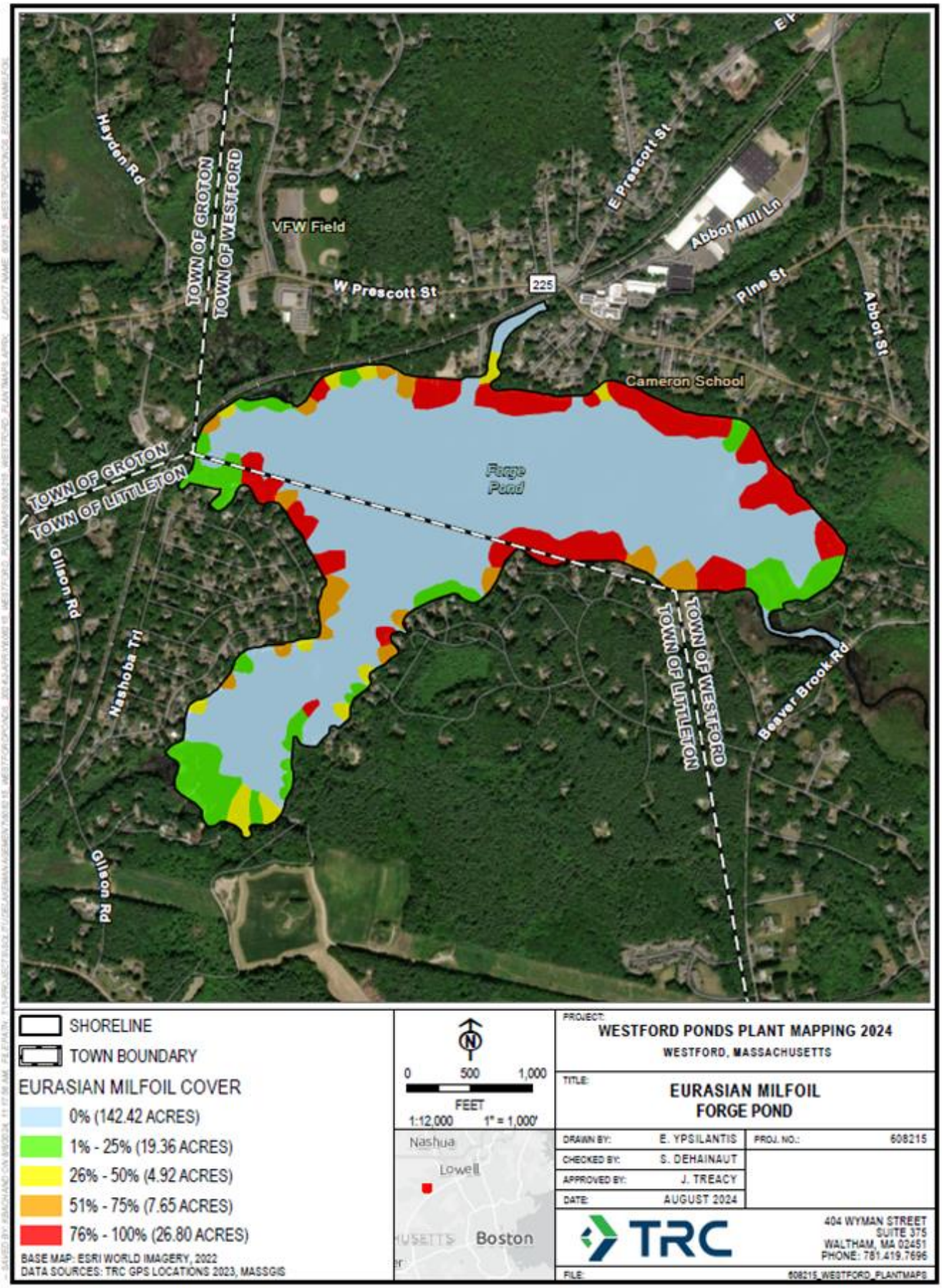

Figure 2. Extent of Eurasian Milfoil on Lake Matawanakee / Forge Pond (Summer 2024)

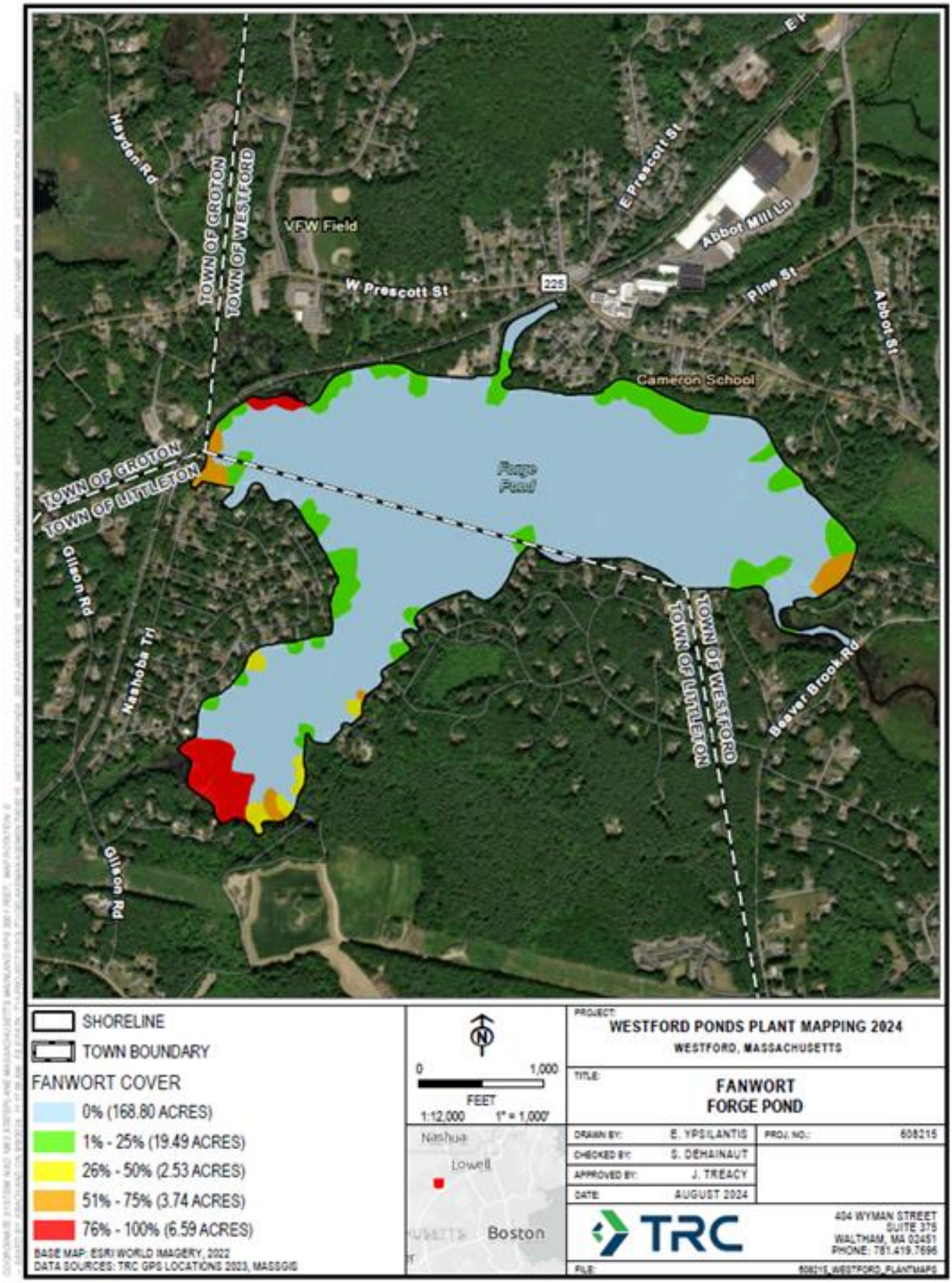

Figure 3. Extent of Fanwort on Lake Matawanakee / Forge Pond (Summer 2024)

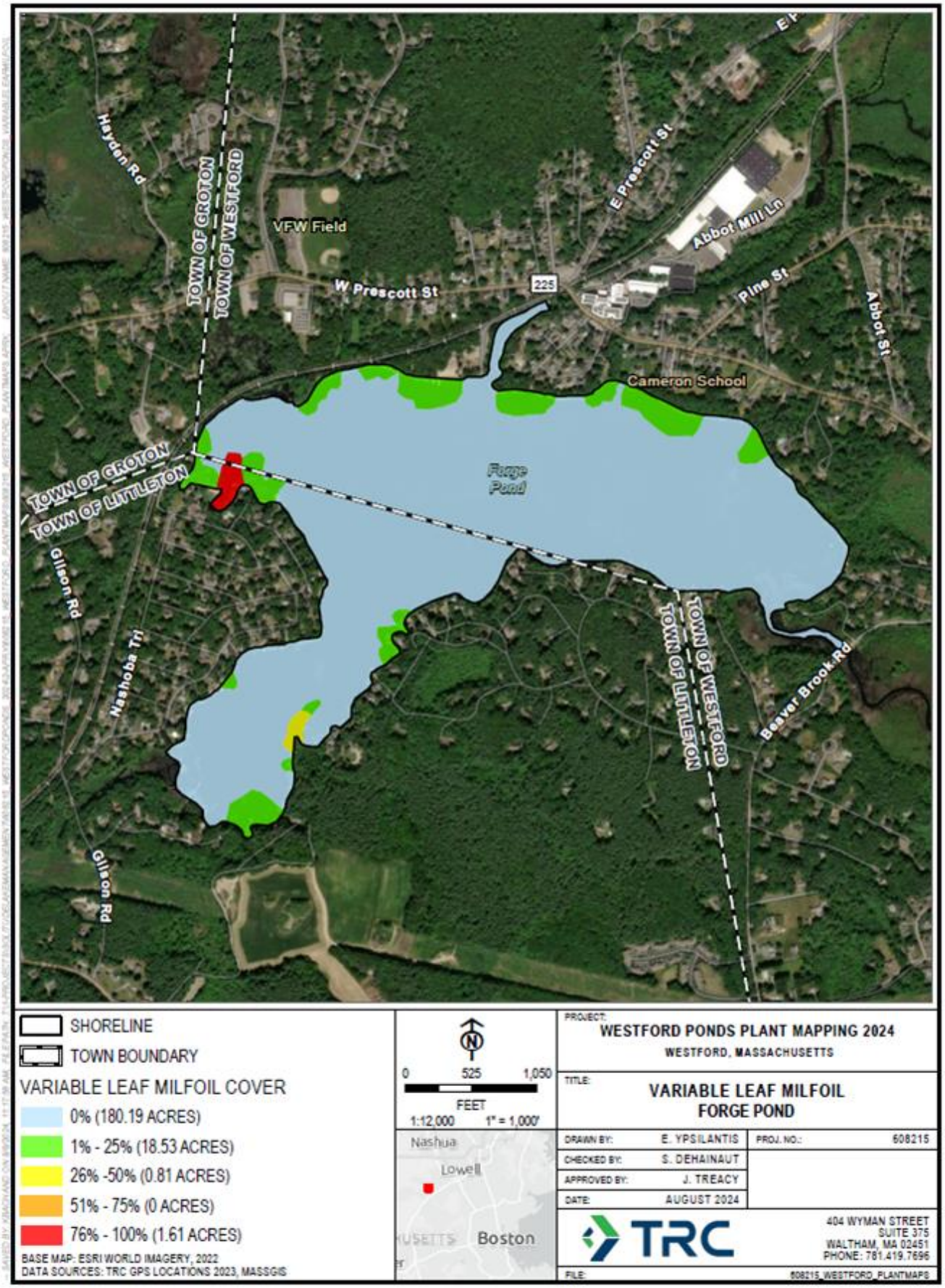

Figure 4. Extent of Variable Leaf Milfoil on Lake Matawanakee / Forge Pond (Summer 2024)

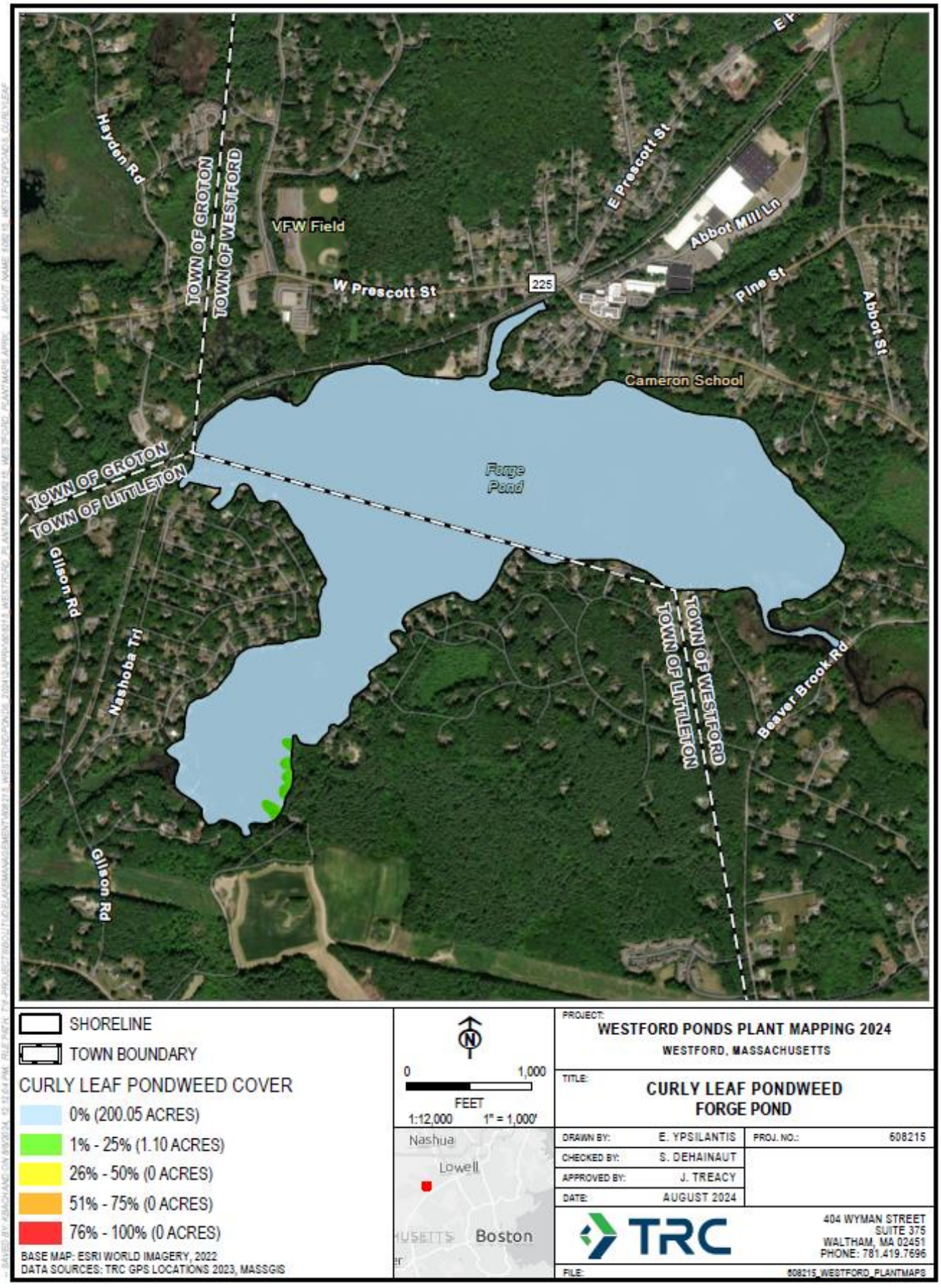

Figure 5. Extent of Curly Leaf Pondweed on Lake Matawanakee / Forge Pond (Summer 2024)

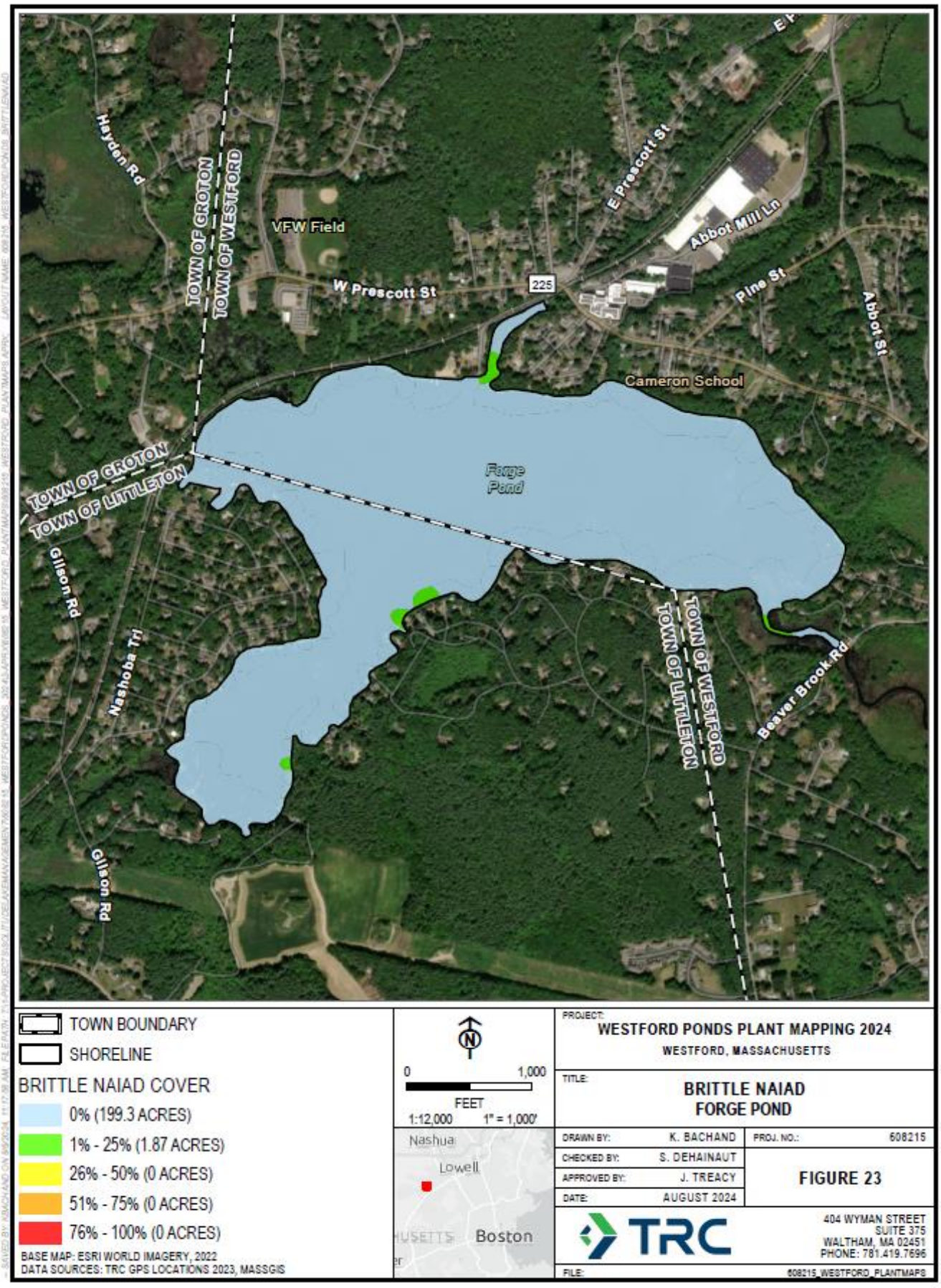

Figure 6. Extent of Brittle Naiad on Lake Matawanakee / Forge Pond (Summer 2024)

Figure 7. Eco-Harvester system, showing overall vessel, rotating drum at the front, and conveyor belt carrying harvested plant material into the containment hopper.