Notice of Intent Application

Proposal to Include Mechanical Harvesting
as Part of the Aquatic Management Program
at Freeman Lake

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April 23, 2025

BY ELECTRONIC MAIL

Chelmsford Conservation Commission
50 Billerica Road
Chelmsford, MA 01824

Attn: David Koonce, Conservation Agent
Phone: 978-250-5231; Option 2
Email: DKoonce@ChelmsfordMA.Gov

RE: Notice of Intent (NOI) application to include mechanical harvesting as part of the Aquatic Management Program at Freeman Lake

Chelmsford Conservation Commission
50 Billerica Road, Chelmsford, MA 01824

Dear Mr. Koonce and Conservation Commission Members:

The Town of Chelmsford, the "Applicant," has prepared the following Notice of Intent (NOI) Application to meet the requirements of the Massachusetts Wetlands Protection Act (MGL Ch. 131 Sec. 40) and its Regulations (310 CMR 10.00, et seq) (the "Act"); and the Town of Chelmsford Wetlands Protection Bylaw, and related regulations, as applicable. The project is located at Freeman Lake, which is located entirely in Chelmsford, Massachusetts. The Applicant is seeking approval to include mechanical harvesting as part of the Aquatic Management Program at Freeman Lake (see Figure 1). The proposed project has been filed as an Ecological Restoration Limited Project under 310 CMR 10.53(4) and will protect the interest of the Wetland Protection Act by controlling non-native, nuisance species, improving fish habitat, improving water quality, and slowing pond eutrophication.

Pond/Site Description

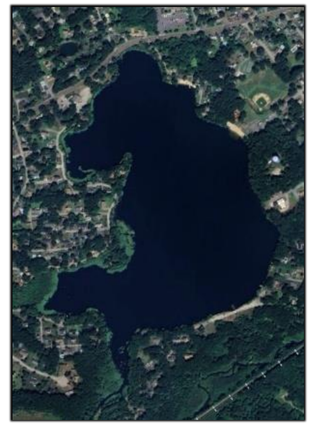

Figure 1: Freeman Lake – Chelmsford, MA

Freeman Lake, also known as Newfield Pond (pictured in Figure 1) is approximately 77 surface acres and is located in Chelmsford, MA. This waterbody is primarily bordered by small woodlands and residential developments. Freeman Lake watershed consists of both a local watershed and a much larger watershed associated with the diversion from Stony Brook. There are two small boat launches situated at Freeman Lake: one along Shore Drive and the other adjacent to the town beach on Adams Street. Based on bathymetric surveys from the Massachusetts Division of Fisheries and Wildlife (DFW) in 2024, the maximum depth of Freeman Lake is approximately 26 ft, with an average depth of 11.9 ft. Several studies of Freeman Lake have been conducted over the past several decades. Most notably, the Freeman Lake Diagnostic and Management Assessment (Worden 1995) and more recently the Update of the Freeman Lake Diagnostic and Management Assessment (TRC 2023-2024). The TRC report was issued in March of 2025 and included extensive data pertaining to the watershed, vegetation assemblage, water quality, biological resources, bathymetry, nutrient loading, point source discharge, as well as an updated alternatives analysis and management recommendations. TRC identified/confirmed several detriments to Freeman Lake, which The Town of Chelmsford plans to address for the rehabilitation of Freeman Lake. This will allow for not only future enjoyment of the Lake, but also improved habitat, improved water quality and slowing eutrophication.

Problem Statement/Background

Table 1: Aquatic Plant Species Observed in Freeman Lake (TRC, 6/26/2024)

Common Name	Scientific Name	Native or Exotic
American Bur-reed	*Sparganium americanum*	Native
Bigleaf Pondweed	*Potamogeton amplifolius*	Native
Canadian Waterweed	*Elodea canadensis*	Native
Common Bladderwort	*Utricularia vulgaris*	Native
Coontail	*Ceratophyllum demersum*	Native
Eurasian milfoil	*Myriophyllum spicatum*	Exotic
Fanwort	*Cabomba caroliniana*	Exotic
Floating-Leaf Pondweed	*Potamogeton epihydrus*	Native
Pickerelweed	*Pontederia cordata*	Native
Spiral Pondweed	*Potamogeton spirillus*	Native
Water Celery	*Vallisneria americana*	Native
Water Chestnut	*Trapa natans*	Exotic
Watershield	*Brasenia schreberi*	Native
White Water Lily	*Nymphaea odorata*	Native
Yellow Water Lily	*Nuphar variegata*	Native

A quantitative survey conducted in June of 2024 by TRC revealed the presence of 12 native and 3 non-native invasive species. This is depicted in Table 1 to the left. TRC reported that Eurasian milfoil (*Myriophyllum spicatum*) was the most prevalent invasive species, followed by invasive water chestnut (*Trapa natans*) and fanwort (*Cabomba caroliniana*). The highest density of plant coverage was found along the western shoreline of Freeman Lake, extending into the southern and northern cove areas. In 2018, SOLitude Lake Management reported invasive curly-leaf pondweed (*Potamogeton crispus*) and brittle naiad (*Najas minor*); however, these species were not observed in the most recent surveys conducted by TRC. The invasive species documented are of concern to the overall health of the Lake.

Figure 2: Native waterlilies mixed with invasive fanwort and Eurasian milfoil in Freeman Lake (TRC, 2024)

The TRC study documented that approximately 19.2 acres of the lake contained aquatic plant coverage, with a majority of the vegetation covering more than 75% of the lake bottom. Non-native Eurasian milfoil, fanwort, and water chestnut impose negative impacts largely due to their dense foliage. TRC reported that most aquatic plant beds were characterized by biovolumes exceeding 50% of the water column. The excessive plant cover can reduce fish density and not only inhibits recreational use of shoreline properties and beach areas but also has the ability to interfere with oxygen exchange which can harm the fishery and potentially cause harmful algae blooms. The competitive, vegetative growth also reduces light for benthic organisms and healthy assemblages of native vegetation. As a result, dense monocultures can form and species richness within the lake is greatly reduced. While not within the purview of the Wetlands Protection Act, it is important to note that the dense exotic invasive species distribution poses a potential safety risk to recreational users and impedes search and rescue missions, should they be necessary.

The TRC Study suggests that Freeman Lake is in a eutrophic state, which is a condition where a body of water has high levels of nutrients. This eutrophic state is supported by measured values for Secchi disk transparency, chlorophyll a, and total phosphorus. This data is a snapshot of the conditions at the time of sampling and may not represent long-term trends or variations; which is why annual surveys are included in the long-term management plan for Freeman Lake. A eutrophic state can lead to excessive plant and algae growth, which can impact water quality and aquatic life. Given this eutrophic state and the recreational activity that occurs at the Lake, emphasis should be placed on monitoring algal blooms. While algal growth serves an important role in the eco-system as a beneficial food source, dense filamentous algae can cause depleted dissolved oxygen and even fish kills. The safety of pond users is of utmost importance and cyanobacteria is of concern in warmer water temperatures during the summer months.

The conditions described above are not conducive to a healthy aquatic eco-system and require management to improve water quality and habitat. Based on Freeman Lake's history and most recently the study conducted by TRC, management within Freeman Lake is necessary to preserve the health of the waterbody. Accordingly, this project proposes to include mechanical harvesting as part of the Aquatic Management Program at Freeman Lake, to improve the ecological function and value of Freeman Lake. A separate NOI has been submitted to initiate an integrated Aquatic Management Program at Freeman Lake.

Project Description

This project proposes including mechanical harvesting as part of the integrated Aquatic Management Program at Freeman Lake. Mechanical harvesting, which involves cutting and/or pulling aquatic plants, with minimal disturbance to the lakebed, from a specially equipped watercraft, can be an effective short-term approach to control plant biomass. This method can be useful for scenarios where reduction in biomass is advantageous, even though it does not result in long-term control of the targeted plant beds.

Harvested plant material will be transferred into a trailer and stockpiled/composted, away from wetlands and water bodies, at the Department of Public Works Storage Facility located at 40 Swain Rd. North Chelmsford, Massachusetts. All material removed will be disposed of in accordance with state and federal regulations. Vegetation volume will be tracked for management purposes, but it is anticipated that less than 100 cubic yards of sediment will be disturbed or removed as part of this activity. Since this volume is below the 401 Water Quality Certification threshold established by MassDEP, a 401 WQC is not required for this project.

No significant alteration to the wetland resource areas will occur as a result of the proposed mechanical harvesting activities. Instead, the resource areas will be enhanced by reducing non-native, invasive Eurasian milfoil, water chestnut, and fanwort. This will subsequently improve water quality and wildlife habitat and reduce eutrophication.

Alternatives Analysis

Prior to submission of this Notice of Intent, several alternatives to the proposed Aquatic Plant Management Plan were considered. The proposed project outlined in this NOI is just part of a larger, comprehensive Aquatic Plant Management Program at Freeman Lake. The following strategies were considered while developing the Aquatic Plant Management Program for Freeman Lake:

Mechanical Hydro-Raking: Not Recommended

Hydro-raking of the species within Freeman Lake is not recommended as it would add maximum disturbance. Hydro-raking is not effective on algae, fanwort, or milfoil and like mechanical harvesting (described above) would promote fragmentation and the potential spread of milfoil.

Biological: Not Recommended

There are no proven biological controls available or approved by the State of Massachusetts for the control of Eurasian milfoil. The option of using triploid grass carp for vegetation control is prohibited in Massachusetts.

Sediment Excavation / Dredging: Not Recommended

Dredging nutrient rich bottom sediment is sometimes used as a strategy to control excessive weed growth. Conventional (dry) or hydraulic (suction) dredging requires an extensive project that is extremely cost prohibitive. Access and staging areas may also be a limiting factor in this management strategy. Dredging may also have severe impacts on aquatic organisms (i.e., fish and macroinvertebrates) in the Pond with no guarantees of elimination of invasive/nuisance vegetation and algae.

Do Nothing: Not Recommended

If the invasive and nuisance species within Freeman Lake are allowed to continue unmanaged, habitat degradation and the eventual loss of native species diversity is imminent. Additionally, eutrophication and filling-in at the waterbody will continue to occur at an accelerated rate due to the annual decomposition of excessive plant material. Possible anoxic conditions could arise from unbalanced plant growth that would degrade water quality and potentially impact fish and other aquatic organisms. Stagnant conditions will also increase water temperatures, potentially promoting both algae and bacterial growth as well as possibly providing extensive mosquito breeding habitat. The waterbody's recreational and aesthetic value would be significantly degraded. Lastly, dense milfoil and fanwort poses a safety risk to the abutters using Freeman Lake.

Estimated Habitats of Rare and Endangered Species

The Town of Chelmsford has checked the Natural Heritage and Endangered Species Program Database (NHESP) to confirm whether Freeman Lake contains rare or endangered species. According to the most recent maps, this waterbody does not fall within an area designated as a priority habitat or estimated habitat.

Impacts of the Proposed Management Plan Specific to the Wetlands Protection Act

The following section provides a brief discussion of the proposed management program's impact on the statutory interests of the Wetlands Protection Act.

Protection of Public and Private Water Supply

Freeman Lake is not used as a drinking water supply. The proposed management techniques at the lake will not have any adverse impacts on the public or private water supply.

Protection of Groundwater Supply

Mechanical harvesting at the lake will not have any adverse impacts on the groundwater supply.

Flood Control and Storm Damage Prevention

No construction or alterations of the existing floodplain and storm damage prevention characteristics of the waterbody are proposed. Unmanaged, annual growth and decomposition of abundant plant growth can contribute to limiting hydraulic capacity, flow and/or outflow, and will increase sediment deposition. Therefore, the proposed management techniques may actually increase the capacity of the resource area over the long-term to provide flood protection.

Prevention of Pollution

No degradation of water quality or increased pollution is expected by the proposed management program. The vegetation removed by the harvester will be moved offsite to 40 Swain Road, decreasing the total plant biomass in the lake, and reducing the potential for increases in nutrients that can cause algae blooms. Removal of the excessive growth of aquatic vegetation will contribute to improved water movement and a reduction in the potential for anoxic conditions. The post-treatment decrease in plant biomass will help to decrease the rate of eutrophication currently caused by the decomposing of excessive plant material.

Protection of Fisheries and Shellfisheries

Dense beds of aquatic vegetation provide poor habitat for most fish species. These conditions have the ability to cause significant fluctuations in dissolved oxygen as well as oxygen depletion during certain times of the year.

Protection of wildlife and wildlife habitat

Excessive dense plant growth, especially non-native plants, provides poor wildlife habitat for fish and other wildlife. The proposed management plan is expected to help prevent further degradation of the waterbody through excessive weed growth and improve the wildlife habitat value long-term. The goal of the multi-year management approach is to increase open-water habitat and biodiversity, as well as prevent the spread of invasive species.

Abutter Notification

Abutters within 300 feet of Freeman Lake will be notified in writing by Mail in accordance with the Massachusetts Department of Environmental Protection (MADEP) policy regarding such notice, which is in effect for NOIs filed after April 13, 1994, as well as the Chelmsford Wetland Bylaw, as applicable. Certified abutters lists are attached in Appendix A and certificate of mailing will be provided to the Conservation Commission prior to the public hearing.

Compliance

The objective of this project is to control invasive and nuisance species. Managing densities of invasive species will typically not adversely affect wildlife habitat and will not negatively impact other interests of the Massachusetts Wetlands Protection Act. No significant alteration to wetland resources areas will occur as a result of the proposed management program, in fact resource areas will be enhanced by controlling the nuisance plant growth. The proposed management activities are consistent with the guidelines in the following documents:

- Final Generic Environmental Impact Report: Eutrophication and Aquatic Plant Management in Massachusetts (June 2004)
- Guidance for Aquatic Plant Management in Lakes and Ponds: As it Relates to the Wetlands Protection Act (April 2004 – DEP Policy/SOP/Guideline # BRP/DWM/WW/G04-1)
- The Practical Guide to Lake Management in Massachusetts (2004)

Mechanical harvesting techniques proposed are approved under the Massachusetts Environmental Protection Act (MEPA) process that was approved in 2004 with the issuance of the FGEIR and the Practical

Guide to Lake and Pond Management in Massachusetts. These approaches do not require individual MEPA review.

Request for Issuance of Order of Conditions

We hereby certify under the penalties of perjury that, to the best of our knowledge, this project meets all eligibility requirements listed in 310 CMR 10.53. The proposed project has been designed to avoid and minimize impacts to existing wetland resource areas as defined under the Massachusetts Wetlands Protection Act (MGL CH. 131 Sec. 40, et seq.). Since the interests of the Act and local Bylaw have been addressed as part of this plan, we request that a five-year Order of Conditions be issued so that management at Freeman Lake may commence in Spring of 2025, as planned. Please feel free to reach out to me directly if you have any questions at all.

Sincerely,

Courtney Thompson
Stormwater Engineer
Town of Chelmsford DPW
978-250-5228 x 5235

Forms

Notice of Intent (NOI) WPA Form 3

Wetland Fee Transmittal Form

Appendix A: Limited Ecological Restoration Project

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Chelmsford
City/Town

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Freeman Lake — a. Street Address
Chelmsford — b. City/Town
MA — c. Zip Code

Latitude and Longitude: 42.63435 — d. Latitude; -71.38913 — e. Longitude

f. Assessors Map/Plat Number
g. Parcel /Lot Number

2. Applicant:

a. First Name
b. Last Name
Town of Chelmsford — c. Organization
50 Billerica Rd — d. Street Address
Chelmsford — e. City/Town
MA — f. State
01824 — g. Zip Code
978-250-5200 — h. Phone Number
i. Fax Number
cthompson@chelmsfordma.gov — j. Email Address

Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name
b. Last Name
Commonwealth of Massachusetts — c. Organization
d. Street Address
e. City/Town
f. State
g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Courtney — a. First Name
Thompson — b. Last Name
Town of Chelmsford DPW — c. Company
9 Alpha Rd — d. Street Address
Chelmsford — e. City/Town
MA — f. State
01824 — g. Zip Code
978-250-5228 — h. Phone Number
i. Fax Number
cthompson@chelmsfordma.gov — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

Municipal-Fee Exempt — a. Total Fee Paid
b. State Fee Paid
c. City/Town Fee Paid

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A. General Information (continued)

6. General Project Description:

Seeking an Order of Conditions to include mechanical harvesting as part of the Aquatic Management Program at Freeman Lake to control nuisance/invasive aquatic plant species.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☐ Transportation
9. ☒ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☒ Yes ☐ No If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

Inland Ecological Restoration Limited Project - 310 CMR 10.53(4) - Management of nuisance and invasive aquatic vegetation to improve habitat value.

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

a. County

b. Certificate # (if registered land)

c. Book

d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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Bureau of Resource Protection - Wetlands
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☒ Land Under Waterbodies and Waterways	3,571,920 1. square feet	2. square feet
	3. cubic yards dredged	

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet	2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced

f. ☐ Riverfront Area

1. Name of Waterway (if available) - **specify coastal or inland**

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: ______ square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet ______ b. square feet within 100 ft. ______ c. square feet between 100 ft. and 200 ft. ______

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☒ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

a. ☐ Yes ☒ No

If yes, include proof of mailing or hand delivery of NOI to:

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

8/1/2021
b. Date of map

If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

c. Submit Supplemental Information for Endangered Species Review*

1. ☐ Percentage/acreage of property to be altered:

(a) within wetland Resource Area ______________________
percentage/acreage

(b) outside Resource Area ______________________
percentage/acreage

2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

(a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

(b) ☐ Photographs representative of the site

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* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. ________ a. NHESP Tracking # ________ b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☐ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Bourne to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Plymouth to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☐ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

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C. Other Applicable Standards and Requirements (cont'd)

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4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

a. ☐ Yes ☒ No — If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

a. ☐ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

2. ☐ A portion of the site constitutes redevelopment

3. ☐ Proprietary BMPs are included in the Stormwater Management System.

b. ☐ No. Check why the project is exempt:

1. ☐ Single-family house

2. ☐ Emergency road repair

3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☒ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☐ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Chelmsford
City/Town

D. Additional Information (cont'd)

3. ☐ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Project Narrative and Figures
a. Plan Title

Town of Chelmsford
b. Prepared By

c. Signed and Stamped by

d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

4/15/2025
g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☐ Attach Stormwater Report, if needed.

E. Fees

1. ☒ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 3 – Notice of Intent
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Chelmsford
City/Town

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	04/23/2025 2. Date
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any)	6. Date

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

tab

return

A. Applicant Information

1. Location of Project:

Freeman Lake
a. Street Address

Chelmsford
b. City/Town

c. Check number

$0
d. Fee amount

2. Applicant Mailing Address:

a. First Name

b. Last Name

Town of Chelmsford
c. Organization

50 Billerica Rd
d. Mailing Address

Chelmsord
e. City/Town

MA
f. State

01824
g. Zip Code

978-250-5200
h. Phone Number

i. Fax Number

cthompson@chelmsfordma.gov
j. Email Address

3. Property Owner (if different):

a. First Name

b. Last Name

Commonwealth of Massachusetts
c. Organization

d. Mailing Address

e. City/Town

f. State

g. Zip Code

h. Phone Number

i. Fax Number

j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Municipal - Fee Exempt			$0

Step 5/Total Project Fee: ____________

Step 6/Fee Payments:

Total Project Fee:	$0 a. Total Fee from Step 5
State share of filing Fee:	$0 b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	$0 c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

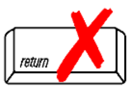
b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

Eligibility Checklist

This Ecological Restoration Limited Project Eligibility Checklist guides the applicant in determining if their project is eligible to file as an Inland or Coastal Ecological Restoration Limited Project (310 CMR 10.53(4) or 310 CMR 10.24(8) respectively). These criteria must be met when submitting the Ecological Restoration Limited Project Notice of Intent to ensure that the restoration and improvement of the natural capacity of a Resource Area(s) to protect and sustain the interests identified in the WPA is **necessary** to achieve the project's ecological restoration goals.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

Regulatory Features of All Coastal and Inland Ecological Restoration Limited Projects

(a) May result in the temporary or permanent loss of/or conversion of Resource Area: An Ecological Restoration Limited Project that meets the requirements of 310 CMR 10.24(8) may result in the temporary or permanent loss of Resource Areas and/or the conversion of one Resource Area to another when such loss is necessary to the achievement of the project's ecological restoration goals.

(b) Exemption from wildlife habitat evaluation: A NOI for an Ecological Restoration Limited Project that meets the minimum requirements for Ecological Restoration Projects and for a MassDEP Combined Application outlined in 310 CMR 10.12(1) and (2) is exempt from providing a wildlife habitat evaluation (310 CMR 10.60).

(c) The following are considerations for applicants filing an Ecological Restoration Limited Project NOI and for the issuing authority approving a project as an Ecological Restoration Limited Project:

- ☐ The condition of existing and historic Resource Areas proposed for restoration.
- ☐ Evidence of the extent and severity of the impairment(s) that reduce the capacity of the Resource Areas to protect and sustain the interests identified in M.G.L. c. 131, § 40.
- ☐ The magnitude and significance of the benefits of the Ecological Restoration Project in improving the capacity of the affected Resource Areas to protect and sustain the other interests identified in M.G.L. c. 131, § 40.
- ☐ The magnitude and significance of the impacts of the Ecological Restoration Project on existing Resource Areas that may be modified, converted and/or lost and the interests for which said Resource Areas are presumed significant in 310 CMR 10.00, and the extent to which the project will:

  a. avoid adverse impacts to Resource Areas and the interests identified in M.G.L. c. 131, § 40, that can be avoided without impeding the achievement of the project's ecological restoration goals.

  b. minimize adverse impacts to Resource Areas and the interests identified in M.G.L. c. 131, § 40, that are necessary to the achievement of the project's ecological restoration goals.

  c. utilize best management practices such as erosion and siltation controls and proper construction sequencing to avoid and minimize adverse construction impacts to resource areas and the interests identified in M.G.L. c. 131, § 40.

Eligibility Criteria - Coastal Ecological Restoration Limited Projects (310 CMR 10.24(8))

Complete this Eligibility Criteria Checklist ***before*** filling out a Notice of Intent Application to determine if your project qualifies as a Coastal Ecological Restoration Limited Project. (310 CMR 10.24(8)) Sign the Eligibility Certification at the end of Appendix A, and attach the checklist with supporting documentation and the Eligibility Certification to your Notice of Intent Application.

General Eligibility Criteria for All Coastal Ecological Restoration Limited Projects

Notwithstanding the requirements of 310 CMR 10.25 through 10.35, 310 CMR 10.54 through 10.58, and the Wildlife Habitat evaluations in 310 CMR 10.60, the Issuing Authority may issue an Order of Conditions permitting an Ecological Restoration Project listed in 310 CMR 10.24(8)(e) as an Ecological Restoration Limited Project and impose such conditions as will contribute to the interests identified in the WPA M.G.L. provided that the project meets all the requirements in 310 CMR 10.24 (8).

- ☐ The project is an Ecological Restoration Project as defined in 310 CMR 10.04 and is a project type listed below [310 CMR 10.24(8)(e)].
- ☐ Tidal Restoration.
- ☐ Shellfish Habitat Restoration.
- ☐ Other Ecological Restoration Limited Project Type.
- ☐ The project will further at least one of the WPA (M.G.L. c. 131, § 40) interests identified below.
  - ☐ Protection of public or private water supply.
  - ☐ Protection of ground water supply.
  - ☐ Flood control.
  - ☐ Storm damage prevention.
  - ☐ Prevention of pollution.
  - ☐ Protection of land containing shellfish.
  - ☐ Protection of fisheries.
  - ☐ Protection of wildlife habitat.
- ☐ If the project will impact an area located within estimated habitat which is indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands, a NHESP preliminary written determination is attached to the NOI submittal that the project will not have any adverse long-term and short-term effects on specified habitat sites of Rare Species or the project will be carried out in accordance with an approved NHESP habitat management plan.

Eligibility Criteria - Coastal Ecological Restoration Limited Projects (310 CMR 10.24(8)) (Cont.)

General Eligibility Criteria for All Coastal Ecological Restoration Limited Projects (cont.)

- ☐ If the project is located in a Coastal Dune or Barrier Beach, the project avoids and minimizes armoring of the Coastal Dune or Barrier Beach to the maximum extent practicable.
- ☐ The project complies with all applicable provisions of 310 CMR 10.24(1) through (6) and 310 CMR 10.24(9) and (10).

Additional Eligibility Criteria for Specific Coastal Ecological Restoration Limited Project Types

These additional criteria must be met to qualify as an Ecological Restoration Limited Project to ensure that the restoration and improvement of the natural capacity of a Resource Area to protect and sustain the interests identified in the WPA is **necessary** to achieve the project's ecological restoration goals.

- ☐ This Ecological Restoration Limited Project application meets the eligibility criteria for Ecological Restoration Limited Project [310 CMR 10.24(8)(a) through (d) and as proposed, furthers at least one of the WPA interests is for the project type identified below.
  - ☐ **Tidal Restoration Projects**
    - ☐ A project to restore tidal flow that will not significantly increase flooding or storm damage impacts to the built environment, including without limitation, buildings, wells, septic systems, roads or other man-made structures or infrastructure.
  - ☐ **Shellfish Habitat Restoration Projects**
    - ☐ The project has received a Special Projects Permit from the Division of Marine Fisheries or, if a municipality, has received a shellfish propagation permit.
    - ☐ The project is made of cultch (e.g., shellfish shells from oyster, surf or ocean clam) or is a structure manufactured specifically for shellfish enhancement (e.g., reef blocks, reef balls, racks, floats, rafts, suspended gear).
  - ☐ **Other Ecological Restoration Projects** that meet the criteria set forth in 310 CMR 10.24(8)(a) through (d).
    - ☐ Restoration, enhancement, or management of Rare Species habitat.
    - ☐ Restoration of hydrologic and habitat connectivity.
    - ☐ Removal of aquatic nuisance vegetation to impede eutrophication.
    - ☐ Thinning or planting of vegetation to improve habitat value.
    - ☐ Fill removal and re-grading.
    - ☐ Riparian corridor re-naturalization.
    - ☐ River floodplain re-connection.

Eligibility Criteria - Coastal Ecological Restoration Limited Projects (310 CMR 10.24(8)) (Cont.)

Additional Eligibility Criteria for Specific Coastal Ecological Restoration Limited Project Types

- ☐ In-stream habitat enhancement.
- ☐ Remediation of historic tidal wetland ditching.
- ☐ Eelgrass restoration.
- ☐ Invasive species management.
- ☐ Installation of fish passage structures.
- ☐ Other. Describe: ______________________________

☐ This project involves the construction, repair, replacement or expansion of public or private infrastructure (310 CMR 10.24(9).

- ☐ The NOI attachment labeled _____ is an operation and maintenance plan to ensure that the infrastructure will continue to function as designed.
- ☐ The operation and maintenance plan will be implemented as a continuing condition in the Order of Conditions and the Certificate of Compliance.
- ☐ This project proposes to replace an existing stream crossing (310 CMR 10.24(10). The crossing complies with the Massachusetts Stream Crossing Standards to the maximum extent practicable with details provided in the NOI. The crossing type:
  - ☐ Replaces an existing non-tidal crossing that is part of an Anadromous/Catadromous Fish Run (310 CMR 10.35)
  - ☐ Replaces an existing tidal crossing that restricts tidal flow. The tidal restriction will be eliminated to the maximum extent practicable.
- ☐ At a minimum, in evaluating the potential to comply with the standards to the maximum extent practicable the following criteria have been consider site constraints in meeting the standard, undesirable effects or risk in meeting the standard, and the environmental benefit of meeting the standard compared to the cost, by evaluating the following:
  - ☐ The potential for downstream flooding;
  - ☐ Upstream and downstream habitat (in-stream habitat, wetlands);
  - ☐ Potential for erosion and head-cutting;
  - ☐ Stream stability;
  - ☐ Habitat fragmentation caused by the crossing;
  - ☐ The amount of stream mileage made accessible by the improvements;
  - ☐ Storm flow conveyance;

Eligibility Criteria - Coastal Ecological Restoration Limited Projects (310 CMR 10.24(8)) (Cont.)

Additional Eligibility Criteria for Specific Coastal Ecological Restoration Limited Project Types

- ☐ Engineering design constraints specific to the crossing;
- ☐ Hydrologic constraints specific to the crossing;
- ☐ Impacts to wetlands that would occur by improving the crossing;
- ☐ Potential to affect property and infrastructure; and
- ☐ Cost of replacement.

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4))

Complete this Eligibility Criteria Checklist ***before*** filling out a Notice of Intent Application to determine if your project qualifies as an Inland Ecological Restoration Limited Project. (310 CMR 10.53(4)) Sign the Eligibility Certification at the end of Appendix A, and attach the checklist with supporting documentation and the Eligibility Certification to your Notice of Intent Application.

General Eligibility Criteria for All Inland Ecological Restoration Limited Projects

Notwithstanding the requirements of any other provision of 310 CMR 10.25 through 10.35, 310 CMR 10.54 through 10.58, and 310 CMR 10.60, the Issuing Authority may issue an Order of Conditions permitting an Ecological Restoration Project listed in 310 CMR 10.53(4)(e) as an Ecological Restoration Limited Project and impose such conditions as will contribute to the interests identified in M.G.L. c. 131, § 40, provided that:

- ☒ The project is an Ecological Restoration Project as defined in 310 CMR 10.04 and is a project type listed below [310 CMR 10.53(4)(e)].
  - ☐ Dam Removal
  - ☐ Freshwater Stream Crossing Repair and Replacement
  - ☐ Stream Daylighting
  - ☐ Tidal Restoration
  - ☐ Rare Species Habitat Restoration
  - ☐ Restoring Fish Passageways
  - ☒ Other (describe project type): Removal of invasive and nuisance aquatic vegetation

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4)) (cont.)

General Eligibility Criteria for All Inland Ecological Restoration Limited Projects

☒ The project will further at least one of the WPA (M.G.L. c. 131, § 40) interests identified below.

- ☐ Protection of public or private water supply
- ☐ Protection of ground water supply
- ☐ Flood control
- ☐ Storm damage prevention
- ☐ Prevention of pollution
- ☐ Protection of land containing shellfish
- ☒ Protection of fisheries
- ☒ Protection of wildlife habitat

☐ If the project will impact an area located within estimated habitat which is indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands, a NHESP preliminary written determination is attached to the NOI submittal that the project will have no adverse long-term and short-term effects on specified habitat sites of Rare Species or the project will be carried out in accordance with an approved NHESP habitat management plan.

☐ The project will be carried out in accordance with any time of year restrictions or other conditions recommended by the Division of Marine Fisheries for coastal waters and the Division of Fisheries and Wildlife in accordance with 310 CMR 10.11(3).

☐ If the project involves the dredging of 100 cubic yards of sediment or more or dredging of any amount in an Outstanding Resource Water, a Water Quality Certification has been applied for or obtained.

☐ The project complies with all applicable provisions of 310 CMR 10.53(1), (2), (7), and (8).

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4)) (cont.)

Additional Eligibility Criteria for Specific Inland Ecological Restoration Limited Project Types

These additional criteria must be met to qualify as an Ecological Restoration Limited Project to ensure that the restoration and improvement of the natural capacity of a Resource Area to protect and sustain the interests identified in the WPA is **necessary** to achieve the project's ecological restoration goals.

☒ This project application meets the eligibility criteria for Ecological Restoration Limited Project in accordance with [310 CMR 10.53(4)(a) through (d) and as proposed, furthers at least one of the WPA interests is for the project type identified below:

- ☐ **Dam Removal**
  - ☐ Project is consistent with MassDEP's 2007 Dam Removal Guidance.
- ☐ **Freshwater Stream Crossing Repair and Replacement**. The project as proposed and the NOI describes how:
  - ☐ Meeting the eligibility criteria set forth in 310 CMR 10.13 would result in significant stream instability or flooding hazard that cannot otherwise be mitigated, and site constraints make it impossible to meet said criteria.
  - ☐ The project design ensures that the stability of the bank is NOT impaired.
  - ☐ To the maximum extent practicable, the project provides for the restoration of the stream upstream and downstream of the structure as needed to restore stream continuity and eliminate barriers to aquatic organism movement.
  - ☐ The project complies with the requirements of 310 CMR 10.53(7) and (8).
- ☐ **Stream Daylighting Projects**
  - ☐ The project meets the eligibility criteria for Ecological Restoration Limited Project [310 CMR 10.53(4)(a) through (d)] and as proposed the NOI describes how the proposed project meets to the maximum extent practicable, consistent with the project's ecological restoration goals, all the performance standards for Bank and Land Under Water Bodies and Waterways.
  - ☐ The project meets the requirements of 310 CMR 10.12(1) and (2) and a wildlife habitat evaluation is not included in the NOI.
- ☐ **Tidal Restoration Project**
  - ☐ Restores tidal flow.
  - ☐ the project, including any proposed flood mitigation measures, will not significantly increase flooding or storm damage to the built environment, including without limitation, buildings, wells, septic systems, roads or other man-made structures or infrastructure.

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4)) (cont.)

☒ **Other Ecological Restoration Projects** that meet the criteria set forth in 310 CMR 10.53 (4) (a) through (d).

- ☐ Restoration, enhancement, or management of Rare Species habitat.
- ☐ Restoration of hydrologic and habitat connectivity.
- ☒ Removal of aquatic nuisance vegetation to impede eutrophication.
- ☒ Thinning or planting of vegetation to improve habitat value.
- ☐ Riparian corridor re-naturalization.
- ☐ River floodplain re-connection.
- ☐ In-stream habitat enhancement.
- ☐ Fill removal and re-grading.
- ☐ Flow restoration.
- ☐ Installation of fish passage structures.
- ☒ Invasive species management.
- ☐ Other. Describe: ______

☐ This project involves the construction, repair, replacement or expansion of public or private infrastructure. (310 CMR 10.53(7))

- ☐ The NOI attachment labeled _____ is an operation and maintenance plan to ensure that the infrastructure will continue to function as designed.
- ☐ The operation and maintenance plan will be implemented as a continuing condition in the Order of Conditions and the Certificate of Compliance.

☐ This project replaces an existing stream crossing (310 CMR 10.53(8)). The crossing type:

- ☐ Replaces an existing non-tidal crossing designed to comply with the Massachusetts Stream Crossing Standards to the maximum extent practicable with details provided in the NOI.
- ☐ Replaces an existing tidal crossing that restricts tidal flow. The tidal restriction will be eliminated to the maximum extent practicable.

Eligibility Criteria - Inland Ecological Restoration Limited Project (310 CMR 10.53(4)) (cont.)

- ☐ At a minimum, in evaluating the potential to comply with the standards to the maximum extent practicable the following criteria have been consider site constraints in meeting the standard, undesirable effects or risk in meeting the standard, and the environmental benefit of meeting the standard compared to the cost, by evaluating the following:
  - ☐ The potential for downstream flooding;
  - ☐ Upstream and downstream habitat (in-stream habitat, wetlands);
  - ☐ Potential for erosion and head-cutting;
  - ☐ Stream stability;
  - ☐ Habitat fragmentation caused by the crossing;
  - ☐ The amount of stream mileage made accessible by the improvements;
  - ☐ Storm flow conveyance;
  - ☐ Engineering design constraints specific to the crossing;
  - ☐ Hydrologic constraints specific to the crossing;
  - ☐ Impacts to wetlands that would occur by improving the crossing;
  - ☐ Potential to affect property and infrastructure; and
  - ☐ Cost of replacement.

Required Actions (310 CMR 10.11)

Complete the Required Actions before submitting a Notice of Intent Application for an Ecological Restoration Project and submit a completed copy of this Checklist with the Notice of Intent.

☒ **Massachusetts Environmental Policy Act (MEPA) / Environmental Monitor**
https://www.mass.gov/service-details/the-environmental-monitor

For Ecological Restoration Limited Projects, there are no changes to MEPA requirements.

☒ Submit written notification at least 14 days prior to the filing of a Notice of Intent (NOI) to the Environmental Monitor for publication. A copy of the written notification is attached and provides at minimum:

- ☒ A brief description of the proposed project.
- ☒ The anticipated NOI submission date to the conservation commission.
- ☒ The name and address of the conservation commission that will review the NOI.
- ☒ Specific details as to where copies of the NOI may be examined or acquired and where to obtain the date, time, and location of the public hearing.

☐ **Massachusetts Endangered Species Act (MESA) /Wetlands Protection Act Review**

- ☐ Preliminary Massachusetts Endangered Species Act Review from the Natural Heritage and Endangered Species Program (NHESP) has been met and the written determination is attached.
  - ☐ Supplemental Information for Endangered Species Review has been submitted.

1. ☐ Percentage/acreage of property to be altered:
   - a. Within Wetland Resource Area ____________ Percentage/acreage
   - b. Outside Wetland Resource Area ____________ Percentage/acreage
2. ☐ Assessor's Map or right-of-way plan of site
3. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work.
4. ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)
5. ☐ Photographs representative of the site
6. ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review)

Required Actions (310 CMR 10.11) (cont.)

Make check payable to "Commonwealth of Massachusetts - NHESP" and mail to NHESP:

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

7. Projects altering 10 or more acres of land, also submit:

   a. ☐ Vegetation cover type map of site

   b. ☐ Project plans showing Priority & Estimated Habitat boundaries

OR Check One of the Following:

1. ☐ Project is exempt from MESA review.

Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/ma-endangered-species-act-mesa-overview; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59 – see C4 below)

2. ☐ Separate MESA review ongoing.

a. NHESP Tracking # ____________ b. Date submitted to NHESP ____________

3. ☐ Separate MESA review completed. Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

☐ **Estimated Habitat Map of State-Listed Rare Wetlands Wildlife**

If a portion of the proposed project is located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP), complete the portion below. To view habitat maps, see the **Massachusetts Natural Heritage Atlas** or view the maps electronically at: https://www.mass.gov/guides/masswildlife-publications#-massachusetts-natural-heritage-atlas-

☐ A preliminary written determination from Natural Heritage and Endangered Species Program (NHESP) must be obtained indicating that:

☐ Project will NOT have long- or short-term adverse effect on the actual Resource Area located within estimated habitat indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands Wildlife published by NHESP.

☐ Project will have long- or short-term adverse effect on the actual Resource Area located within estimated habitat indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands Wildlife published by NHESP. A copy of NHESP's written preliminary determination in accordance with 310 CMR 10.11(2) is attached. This specifies:

☐ Date of the map: ____________

Required Actions (310 CMR 10.11) (cont.)

- ☐ If the Rare Species identified is/are likely to continue to be located on or near the project, and if so, whether the Resource Area to be altered is in fact part of the habitat of the Rare Species.
- ☐ That if the project alters Resource Area(s) within the habitat of a Rare Species:
- ☐ The Rare Species is identified;
- ☐ NHESP's recommended changes or conditions necessary to ensure that the project will have no short or long term adverse effect on the habitat of the local population of the Rare Species is provided; or
- ☐ An approved NHESP habitat management plan is attached with this Notice of Intent.

Send the request for a preliminary determination to:
Natural Heritage & Endangered Species Program
MA Division of Fisheries & Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

☐ **Division of Marine Fisheries**

☐ If the project will occur within a coastal waterbody with a restricted Time of Year, [see Appendix B of the Division of Marine Fisheries (DMF) Technical Report TR 47 "Marine Fisheries Time of Year Restrictions (TOYs) for Coastal Alteration Projects" dated April 2011 https://www.nae.usace.army.mil/Portals/74/docs/regulatory/StateGeneralPermits/MA/TR-47.pdf].

☐ Obtain a DMF written determination stating:

- ☐ The proposed work does NOT require a TOY restriction.
- ☐ The proposed work requires a TOY restriction. Specific recommended TOY restriction and recommended conditions on the proposed work is attached.

☐ If the project may affect a diadromous fish run [re: Division of Marine Fisheries (DMF) Technical Reports TR 15 through 18, dated 2004: https://www.mass.gov/service-details/marine-fisheries-technical-reports]

- ☐ Obtain a DMF written determination stating:
  - ☐ The design specifications and operational plan for the project are compatible with the passage requirements of the fish run.
  - ☐ The design specifications and operational plan for the project are not compatible with the passage requirements of the fish run.

Required Actions (310 CMR 10.11) (cont.)

Send the request for a written or electronic determination to:

South Shore – Bourne to Rhode Island border, and the Cape & Islands:
Division of Marine Fisheries –
South Coast Field Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: DMF.EnvReview-South@state.ma.us

North Shore – Plymouth to New Hampshire border:
Division of Marine Fisheries –
North Shore Field Station
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: DMF.EnvReview-North@state.ma.us

☐ **Division of Fisheries and Wildlife –** https://www.mass.gov/orgs/division-of-fisheries-and-wildlife

- ☐ Projects that involve silt-generating, in-water work that will impact a non-tidal perennial river or stream and the in-water work will not occur between May 1 and August 30.
  - ☐ Obtain a written determination from the Division of Fisheries and Wildlife (DFW) as to whether the proposed work requires a TOY restriction.
    - ☐ The proposed work does NOT require a TOY restriction.
    - ☐ The proposed work requires a TOY restriction. The DFW determination with TOY restriction and other conditions is attached.

☐ **MassDEP Water Quality Certification**

- ☐ Project involves dredging of 100 cubic yards or more in a Resource Area or dredging of any amount in an Outstanding Resource Water (ORW). A copy and proof of the MassDEP Water Quality Certification pursuant to 314 CMR 9.00 is attached to the NOI.
- ☐ This project is a Combined Permit Application for 401 Dredging and Restoration (BRP WW 26).

☐ **MassDEP Wetlands Restriction Order**

Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

☐ Yes ☐ No

☐ **Department of Conservation and Recreation**

Office of Dam Safety

- ☐ For Dam Removal Projects, obtain a written determination from the Department of Conservation and Recreation Office of Dam Safety that the dam is not subject to the jurisdiction of the Office under 302 CMR 10.00, a written determination that the dam removal does not require a permit under 302 CMR 10.00 or a permit authorizing the dam removal in accordance with 302 CMR 10.00 has been issued.

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Chelmsford
City/Town

Required Actions (310 CMR 10.11) (cont.)

Areas of Critical Environmental Concern (ACECs)

Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations).

Name of ACEC

Minimum Required Documents (310 CMR 10.12)

Complete the Required Documents Checklist below and provide supporting materials before submitting a Notice of Intent Application for an Ecological Restoration Project.

☒ This Notice of Intent meets all applicable requirements outlined in for Ecological Restoration Projects in 310 CMR 10.12. Use the checklist below to ensure that all documentation is included with the NOI.

At a minimum, a Notice of Intent for an Ecological Restoration Project shall include the following:

☒ Description of the project's ecological restoration goals;

☒ The location of the Ecological Restoration Project;

☐ Description of the construction sequence for completing the project;

☐ A map of the Areas Subject to Protection Under M.G.L. c. 131, § 40, that will be temporarily or permanently altered by the project or include habitat for Rare Species, Habitat of Potential Regional and Statewide Importance, eel grass beds, or Shellfish Suitability Areas.

☐ The method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.) is attached with documentation methodology.

☒ List the titles and dates for all plans and other materials submitted with this NOI.

Project Narrative and Figures
a. Plan Title

Town of Chelmsford
b. Prepared by

c. Signed and Stamped by

d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

g. Date

☐ If there is more than one property owner, attach a list of these property owners not listed on this form.

☒ Attach NOI Wetland Fee Transmittal Form.

Minimum Required Documents (310 CMR 10.12)

- ☐ An evaluation of any flood impacts that may affect the built environment, including without limitation, buildings, wells, septic systems, roads or other man-made structures or infrastructure as well as any proposed flood impact mitigation measures;
- ☒ A plan for invasive species prevention and control;
- ☐ The Natural Heritage and Endangered Species Program written determination in accordance with 310 CMR 10.11(2), if needed;
- ☐ Any Time of Year restrictions and/or other conditions recommended by the Division of Marine Fisheries or the Division of Fisheries and Wildlife in accordance with 310 CMR 10.11(3), (4), (5), if needed;
- ☒ Proof that notice was published in the Environmental Monitor as required by 310 CMR 10.11(1;
- ☐ A certification by the applicant under the penalties of perjury that the project meets the eligibility criteria set forth in 310 CMR 10.13;
- ☐ If the Ecological Restoration Project involves the construction, repair, replacement or expansion of infrastructure, an operation and maintenance plan to ensure that the infrastructure will continue to function as designed;
- ☐ If the project involves dredging of 100 cubic yards or more or dredging of any amount in an Outstanding Resource Water, a Water Quality Certification issued by the Department pursuant to 314 CMR 9.00;
- ☐ If the Ecological Restoration Project involves work on a stream crossing, information sufficient to make the showing required by 310 CMR 10.24(10) for work in a coastal resource area and 310 CMR 10.53(8) for work in an inland resource area; and
- ☐ If the Ecological Restoration Project involves work on a stream crossing, baseline photo-points that capture longitudinal views of the crossing inlet, the crossing outlet and the upstream and downstream channel beds during low flow conditions. The latitude and longitude coordinates of the photo-points shall be included in the baseline data.
- ☐ This project is subject to provisions of the MassDEP Stormwater Management Standards. A copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) is attached.
- ☐ Provide information as the whether the project has the potential to impact private water supply wells including agricultural or aquacultural wells or surface water withdrawal points.

Certification that the Ecological Restoration Project Meets the Eligibility Criteria

I hereby certify under penalties of perjury that the Ecological Restoration Project Notice of Intent application does not meet the Eligibility criteria for an Ecological Restoration Order of Conditions set forth in 310 CMR 10.13, but does meet the Eligibility Criteria for a Ecological Restoration Limited Project set forth in 10.24(8) or 10.53(4) whichever is applicable. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

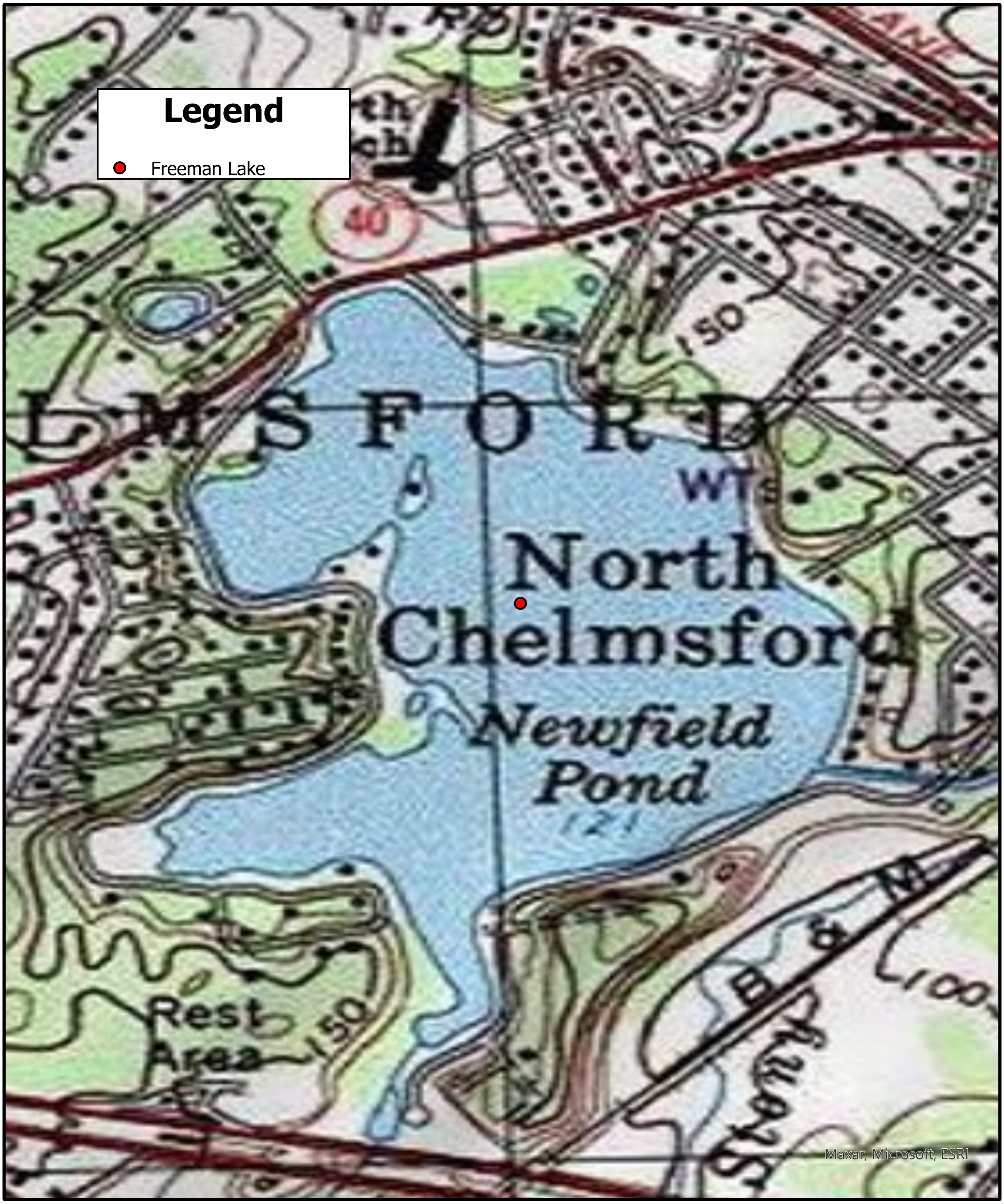
Signature of Applicant or Authorized Agent

Courtney Thompson
Printed Name of Applicant or Authorized Agent

4/23/25
Date

The certification must be signed by the applicant; however, it may be signed by a duly authorized agent (named in Item 2) if this form is accompanied by a statement by the applicant designating the agent and agreeing to furnish upon request, supplemental information in support of the application.

Figures



Freeman Lake (Newfield Pond)

Figure 1: USGS Topo Map

Chelmsford, MA

Map Date

3/17/2025

N

WATER & WETLAND
LAKE, POND & WETLAND MANAGEMENT

Freeman Lake (Newfield Pond)

Figure 2: Natural Heritage Map

Chelmsford, MA

Map Date
3/17/2025

N

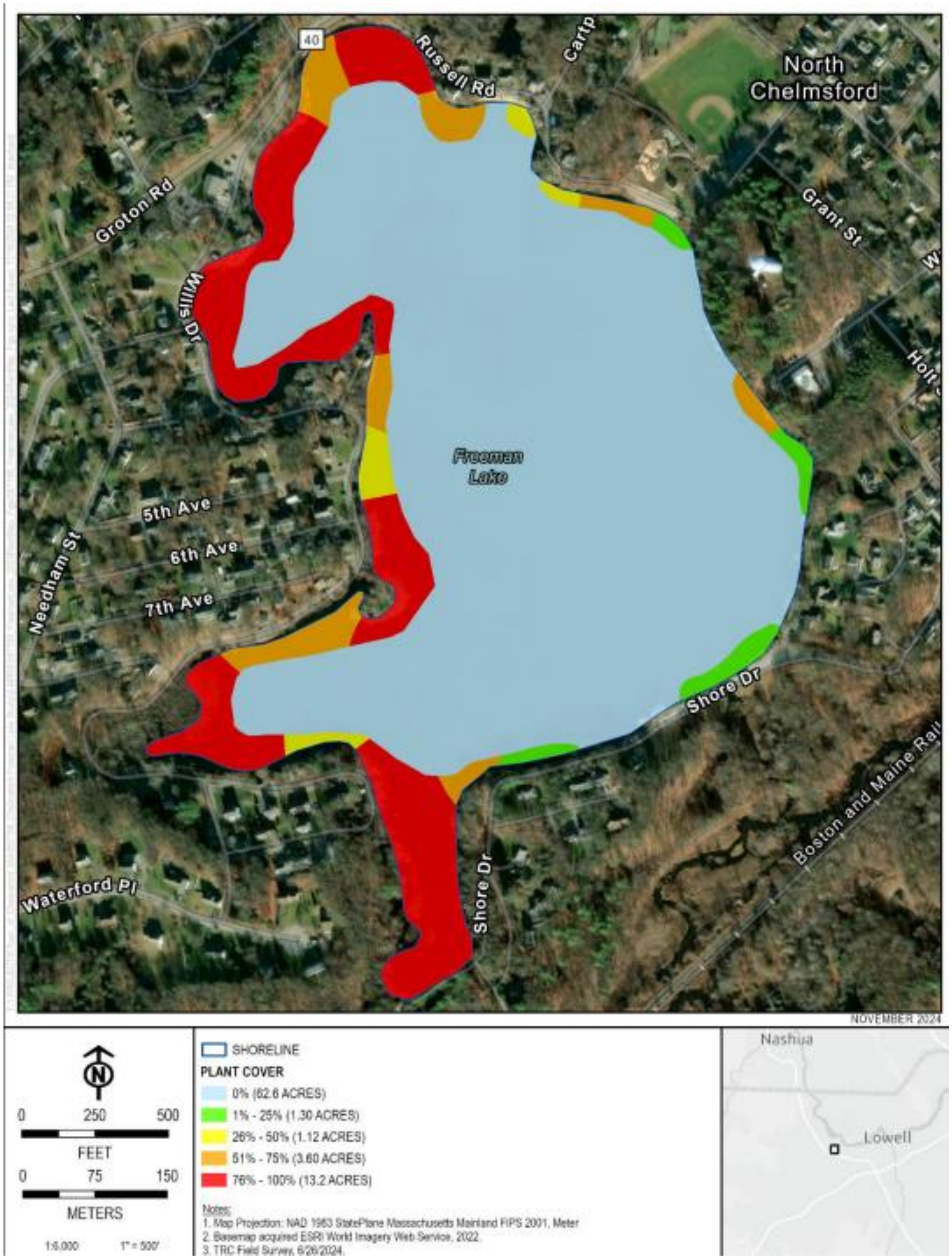


Figure 3: Aquatic Plant Cover Map

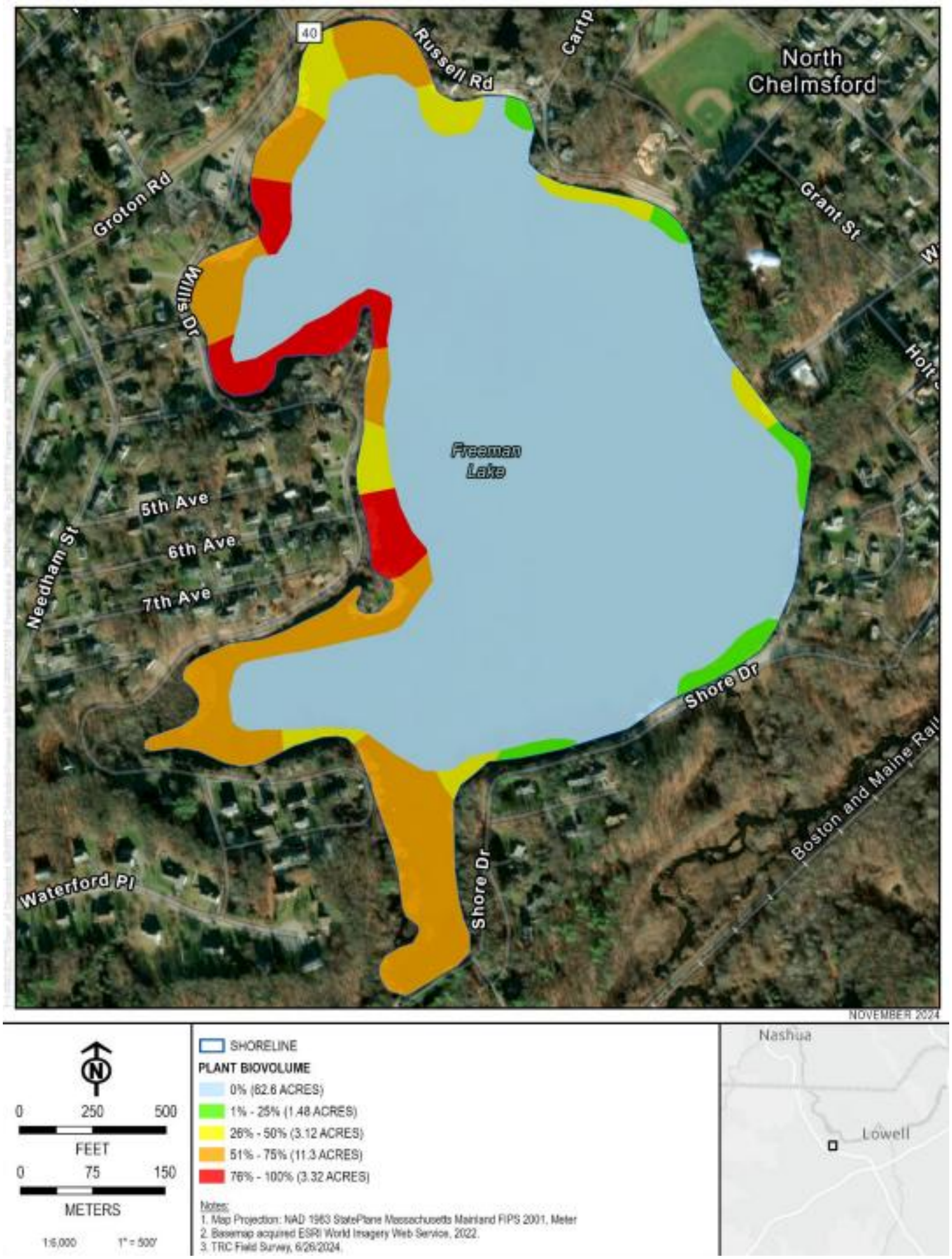


Figure 4: Aquatic Plant Biovolume Map

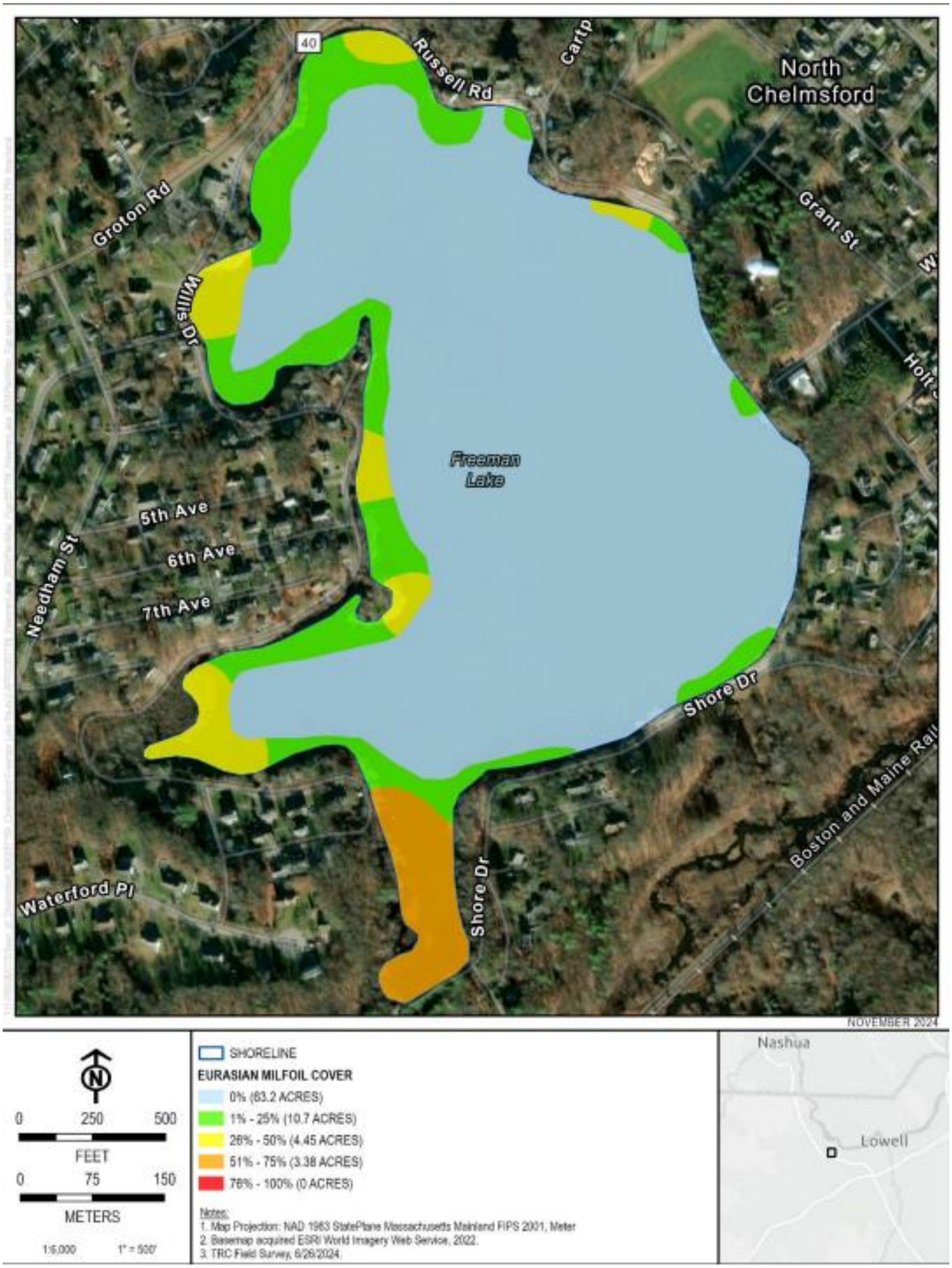


Figure 5: Eurasian Milfoil Distribution and Density Map

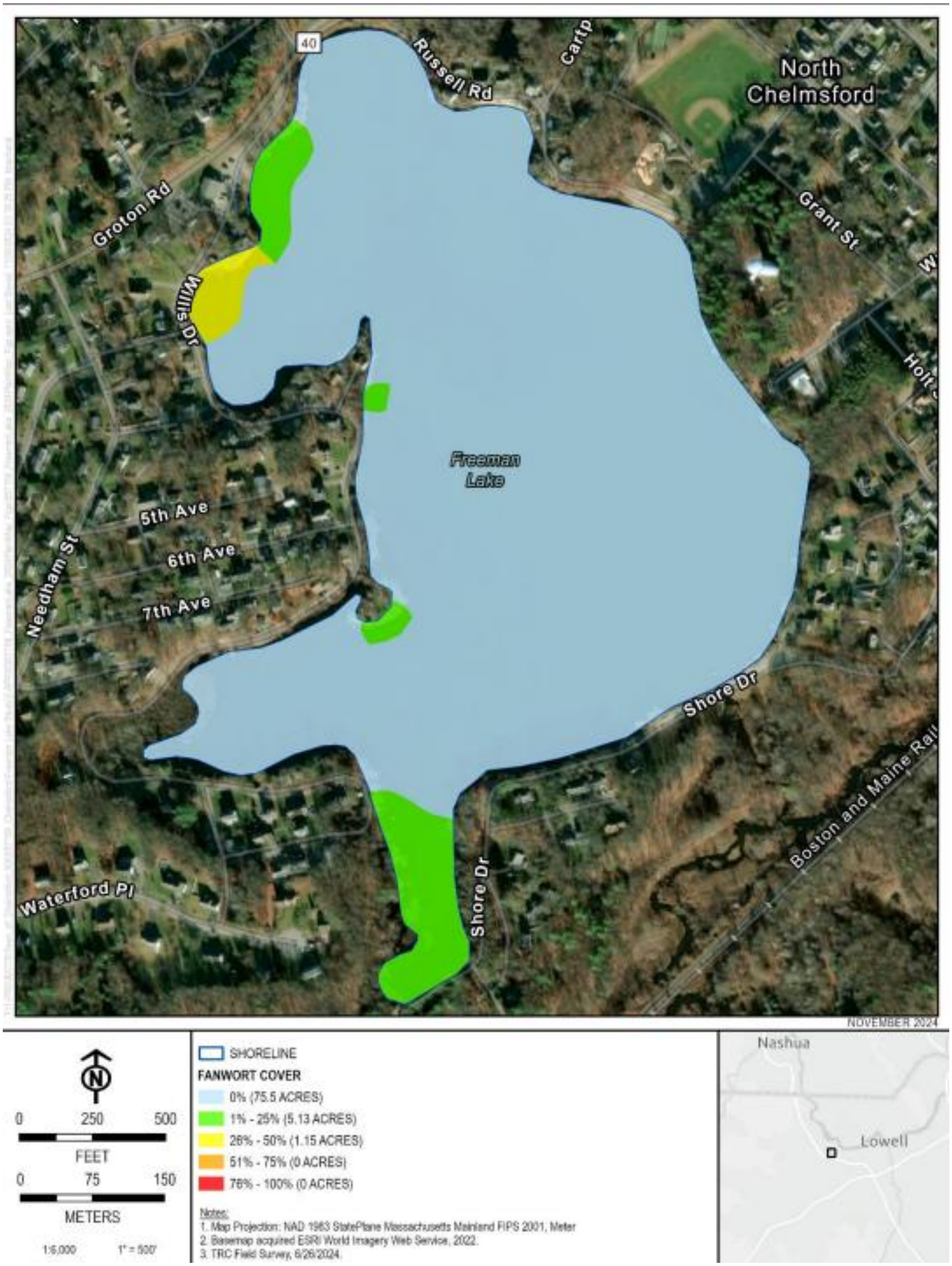


Figure 6: Fanwort Distribution and Density Map

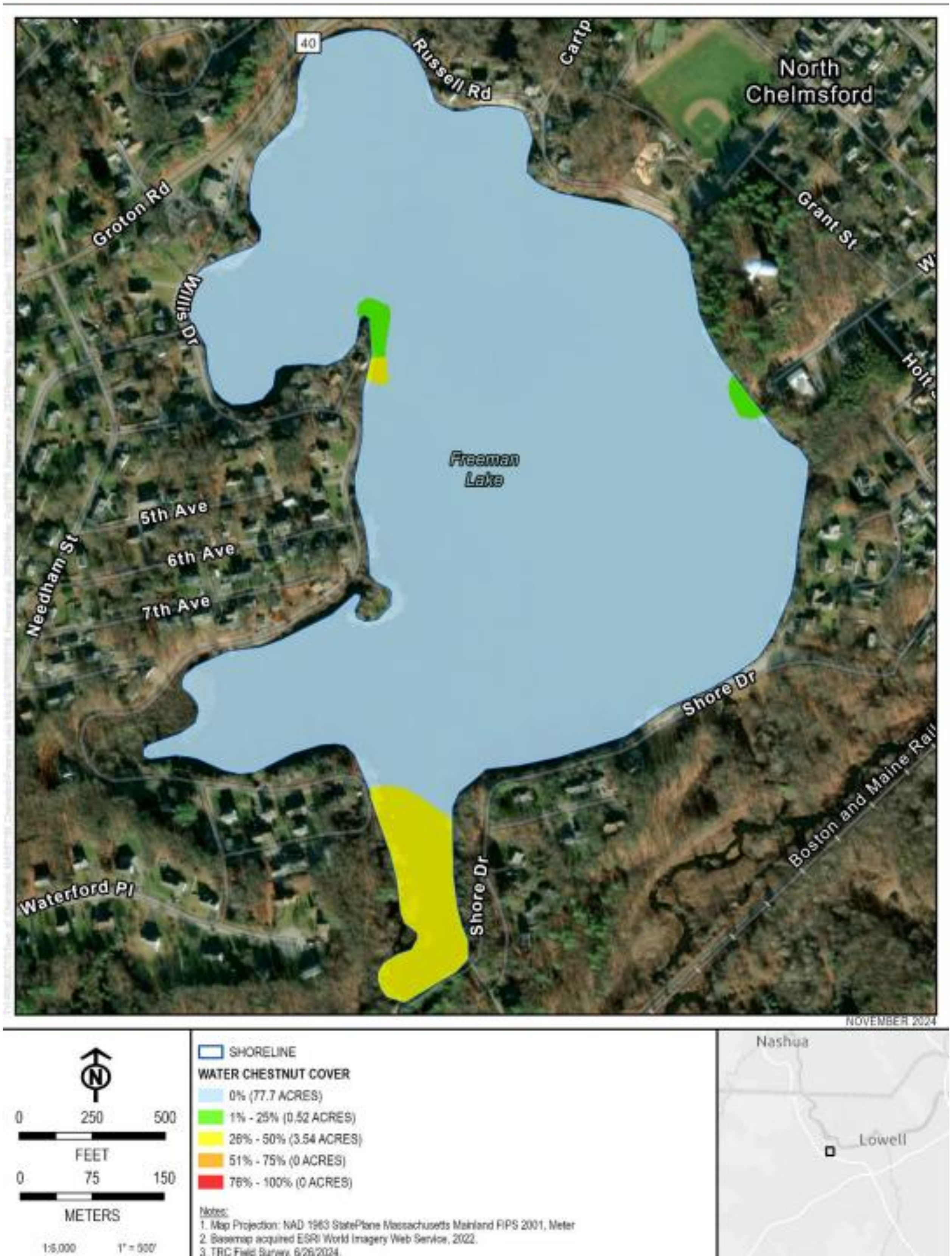


Figure 7: Water Chestnut Distribution and Density Map

Appendix A

Environmental Monitor Publication

Abutter List

TRC Environmental – Update to the Freeman Lake Diagnostic and Management Assessment (2023-2024)

To: The Environmental Monitor

From: The Town of Chelmsford

Date: March 28, 2025

Re: Notification of filing a Notice of Intent (NOI) for Freemen Lake

Anticipated Date of Submission: April 25, 2025

The Proposed project is seeking approval to implement an Aquatic Plant Management Program at Freeman Lake in Chelmsford, MA. This facet of the program will focus on the reduction and control of nuisance and invasive aquatic vegetation through mechanical harvesting techniques. The project aims to protect the interests of the Wetlands Protection Act by slowing eutrophication and improving habitat value.

Reviewing Conservation Commission:

Chelmsford Conservation Commission
50 Billerica Road
Chelmsford, MA 01824

Copies of the Notice of Intent may be examined or acquired by contacting the applicant at Stormwater@chelmsfordma.gov or 978-250-5228 x 5235.

Please see Conservation Commission website for the meeting schedule to confirm exact dates and agendas.

BOARD OF ASSESSORS
Samuel P. Chase
John J. Duffett

Chief Assessor
Frank T. Reen, M.A.A

Assistant Assessor/Data Collector
Rena E. Gagne

Assistant to the Assessor
Susan P. Taylor

Principal Clerk II
Michelle K. O'Hagan

Telephone: (978) 250-5220
Fax: (978) 250-5223

Chelmsford Town Offices
Assessor's Office

50 Billerica Rd.
Chelmsford, MA 01824-2777
www.ChelmsfordMA.Gov

Form to be filled out in the Assessor's Office*
Please allow 3-5 business days for completion.
Fees: $35 first parcel. Additional $10 per parcel on same list.
$35 each parcel on separate lists.

Date: 3/14/2025

Paid: ______ Due: ______

Board Attending: Chelmsford Conservation Commission

Parcel Map/Block/Lot: 18 / 41 / 25
Parcel Map/Block/Lot: ____ / ____ / ____

Owner Name: Town of Chelmsford (Conservation Commission)

Parcel Location: Willis Drive (Freeman Lake)

Parcel Location: ____

Parcel Record Owner Phone Number: (978) 250-5247

Name of Representative & Company: Water and Wetland (On Behalf of Town of Chelmsford)
(Only if other than parcel record owner)

Email: grace@waterandwetland.com

Mailing Address of Representative: PO Box 142, South Grafton, MA 01560

Phone Number of Representative: 508-204-5026

Signature: Grace Adams

*Assessor's Office not responsible for incorrect information if Map/Block/Lot/Unit not verified with office prior to submission.

REVISED 03/21,06/2023

MURRAY BARBARA MARIE
71 TWELFTH AV
NO CHELMSFORD MA 01863

AMERICAN LEGION
A W VINAL POST
90 GROTON RD
NO CHELMSFORD MA 01863

AMERICAN LEGION
A W VINAL POST
90 GROTON RD
NO CHELMSFORD MA 01863

AMERICAN LEGION
A W VINAL POST
90 GROTON RD
NO CHELMSFORD MA 01863

CHOICE HOUSING OPPORTUNITIES
FOR INTERGENERATIONAL
AND COMMUNITY ENDEAVORS INC
10 WILSON ST
CHELMSFORD MA 01824

CHELMSFORD HOUSING
AUTHORITY
10 WILSON ST
CHELMSFORD MA 01824

CHELMSFORD TOWN OF (VARNEY)
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF
CONSERVATION
50 BILLERICA RD
CHELMSFORD MA 01824

MANISCALCO ANTHONY J
6 MALLORY ST
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
CONSERVATION
50 BILLERICA RD
CHELMSFORD MA 01824

MARCOTTE PHILIP R
CHRISTINE M MARCOTTE
7 MALLORY ST
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

DANG MICHLLE &
DANG PETER
22 SHORE DR
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

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CONSERVATION COMMISSION
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CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF (SENIOR
CENTER)
SENIOR CENTER
50 BILLERICA RD
CHELMSFORD MA 01824

NGUYEN-PHO DAU
NGUYEN THAI PHO
9 NELLIE ST
HUDSON NH 03051

MURRAY BARBARA MARIE
71 TWELFTH AV
NO CHELMSFORD MA 01863

LEVASSEUR JUDITH C
16 FIFTH AV
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

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50 BILLERICA RD
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CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

KIM THIA
48 ADAMS ST
NO CHELMSFORD MA 01863

HAMILTON PAUL S &
LORETTA W HAMILTON
9 GRANT ST
NO CHELMSFORD MA 01863

FOTI KRISTIN T &
FOTI JEFFREY D
5 GRANT ST
NO CHELMSFORD MA 01863

TIERNEY JOSEPH H
VICKI G TIERNEY
3 GRANT ST
NO CHELMSFORD MA 01863

GAUTHIER KATHLEEN B TRUSTEE &
GAGNON ANNE E TRUSTEE
55-57 WASHINGTON ST
NO CHELMSFORD MA 01863

GAUTHIER ARTHUR J
KATHLEEN B GAUTHIER
51 WASHINGTON ST
NO CHELMSFORD MA 01863

REDDINGTON SHAYNE PATRICK &
ROSALES GENESA MARIA
47 WASHINGTON ST
NO CHELMSFORD MA 01863

SALYARDS JOHN L
DONNA M C SALYARDS
57 SHERMAN ST
NO CHELMSFORD MA 01863

FORD DAVID L TR
FORD LIVING TRUST
51 SHERMAN ST
NO CHELMSFORD MA 01863

DELUCA NICHOLAS GERALD &
DELUCA MELISSA ANN
49 SHERMAN ST
NO CHELMSFORD MA 01863

GARDNER HEATHER E
43 SHERMAN ST
NO CHELMSFORD MA 01863

REEN FRANCIS T &
DONNA M REEN
41 SHERMAN ST
NO CHELMSFORD MA 01863

GALLAGHER, RYAN &
GALLAGHER, SOVEN
39 SHERMAN ST
NO CHELMSFORD MA 01863

BATTLE BERNARD J
JUNE R BATTLE
31 SHERMAN ST
NO CHELMSFORD MA 01863

NO CHELMSFORD WATER DIST
64 WASHINGTON ST
NO CHELMSFORD MA 01863

NO CHELMSFORD WATER DIST
64 WASHINGTON ST
NO CHELMSFORD MA 01863

NO CHELMSFORD WATER DIST
64 WASHINGTON ST
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

CHHEAN, HEMVATEY
153 WILLIS DR
NO CHELMSFORD MA 01863

PELLEY, THOMAS &
GELINEAU, SARA
44 WASHINGTON ST
NO CHELMSFORD MA 01863

FLANNERY PAUL F &
THERESA A FLANNERY ETAL TRS
6 RUSSELL RD
NO CHELMSFORD MA 01863

OETINGER THOMAS JR &
OETINGER KATHLEEN
48 WASHINGTON ST
NO CHELMSFORD MA 01863

KAHN-GREENE WILLIAM G & SARAH
S TRS
THE WANDS LIVING TRUST
6 RIPLEY ST
NO CHELMSFORD MA 01863

HOYT MARY C
5 VARNEY AV
NO CHELMSFORD MA 01863

GEARY KRISTEN
11 VARNEY AV
NO CHELMSFORD MA 01863

STERN JENNIFER E TR
21 VARNEY AV
NO CHELMSFORD MA 01863

ZAVALICK ALAN E &
MAGDALENA R ZAVALICK
32 RUSSELL RD
NO CHELMSFORD MA 01863

BOURASSA ANNAMARIE
26 RUSSELL RD
NO CHELMSFORD MA 01863

LE, THANH
30 RUSSELL RD
NO CHELMSFORD MA 01863

BOURASSA ANNAMARIE
26 RUSSELL RD
NO CHELMSFORD MA 01863

LUONG EFFIE JESSICA M
ESTANISLAO &
LUONG KENT
13 RIPLEY ST
NO CHELMSFORD MA 01863

BILLINGS CAROLYN &
BILLINGS WARREN
7 RIPLEY ST
NO CHELMSFORD MA 01863

DIMITROV VESELIN &
DIMITROVA MARIYA
50 WASHINGTON ST
NO CHELMSFORD MA 01863

HOLLAND BRIAN T &
COLLEEN M LEBLANC
60 WASHINGTON ST
NO CHELMSFORD MA 01863

CONDE CHRISTOPHER L &
BECKY DASILVA-CONDE
8 HOLT ST
NO CHELMSFORD MA 01863

PELLETIER JACLYN M &
MICHAEL C RINGLAND
12 HOLT ST
NO CHELMSFORD MA 01863

GERVAIS STEVEN D
27 HOLT ST
NO CHELMSFORD MA 01863

FICARA PAOLO G
25 HOLT ST
NO CHELMSFORD MA 01863

FICARA PAOLO G
25 HOLT ST
NO CHELMSFORD MA 01863

VIEIRA WILSON
22 FAIRMOUNT ST
NO CHELMSFORD MA 01863

GERVAIS JOSEPH E &
COURTNEY K PYNE
26 FAIRMOUNT ST
NO CHELMSFORD MA 01863

AVILA JOHN M TRUSTEE
JOHN M AVILA REVOCABLE TRUST
4 SPRING ST
NO CHELMSFORD MA 01863

AVILA JOHN M
BRENDA J AVILA
4 SPRING ST
NO CHELMSFORD MA 01863

KROCHUNE JOHN R &
SUZANNE M KROCHUNE
8 SPRING ST
NO CHELMSFORD MA 01863

TOMAINO DANIEL R &
LISA TOMAINO
12 SPRING ST
NO CHELMSFORD MA 01863

STANICHUCK JIMMY TR
15 FAIRMOUNT STREET REALTY
TRUST
3 SPRING ST
NO CHELMSFORD MA 01863

CARLSON GREGORY R TR &
CARLSON CARLA J TR
17 LAKESHORE RD
WINDHAM NH 03087

THIBODEAU SEAN C
SANTOS JESSICA H
4 GRACE ST
NO CHELMSFORD 01863

STANICHUK JIMMY H
3 SPRING ST
NO CHELMSFORD MA 01863

MCKINNEY CODY &
DEISENROTH KATIE
8 GRACE ST
NO CHELMSFORD MA 01863

MCKINNEY CODY &
DEISENROTH KATIE
8 GRACE ST
NO CHELMSFORD MA 01863

15 SPRING STREET LLC
C/O JOSEPH HOLLAND MGR
P O BOX 2
CHELMSFORD MA 01824

MCENANEY ROBERT A TR &
MCENANEY SUSAN E TR
10 GRACE ST
NO CHELMSFORD MA 01863

LARRABEE RICHARD J &
LARRABEE ELIZABETH P
7 GRACE ST
NO CHELMSFORD MA 01863

MANN GLENN &
STACEY MANN
10 PILLINGS ST
NO CHELMSFORD MA 01863

CHEVALIER PATRICIA A &
ROBERT J CHEVALIER ETAL
14 GRACE ST
NO CHELMSFORD MA 01863

ANDERSON BERNADETTE N
1 SHORE DR
NO CHELMSFORD MA 01863

PETERSON TODD &
DAWN PETERSON
5 GRACE ST
NO CHELMSFORD MA 01863

CLARK ARTHUR J JR
5 FAIRMOUNT ST
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

MAHONEY, LINDA M
16 THIRD AV
NO CHELMSFORD MA 01863

LEE DYLAN EMMETT &
LUNA LAURA
20 RUSSELL RD
NO CHELMSFORD MA 01863

RUCCIO CHRISTOPHER J &
REBECCA O RUCCIOF
60 GROTON RD
NO CHELMSFORD MA 01863

DAVENPORT DAVID
MARCIA DAVENPORT
62 GROTON RD
NO CHELMSFORD MA 01863

DAVENPORT DAVID
MARCIA DAVENPORT
62 GROTON RD
NO CHELMSFORD MA 01863

LEE DYLAN EMMETT &
LUNA LAURA
20 RUSSELL RD
NO CHELMSFORD MA 01863

FLANNERY JENNIFER
6 RUSSELL RD
NO CHELMSFORD MA 01863

SCIARRETTA, MICHAEL B &
LUNN, OUK T
15 RUSSELL RD
NO CHELMSFORD MA 01863

CLANCY GLORIA ANN (LE)
12 RUSSELL RD
NO CHELMSFORD MA 01863

SWANBECK WENDY
41 WILLIS DR
NO CHELMSFORD MA 01863

MADDEN EDWARD
BARBARA MADDEN
16 RUSSELL RD
NO CHELMSFORD MA 01863

LEE DYLAN EMMETT &
LUNA LAURA
20 RUSSELL RD
NO CHELMSFORD MA 01863

SCIARRETTA , MICHAEL B &
LUNN, OUK T
15 RUSSELL RD
NO CHELMSFORD MA 01863

SCIARRETTA, MICHAEL B &
LUNN, OUK T
15 RUSSELL RD
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF (PUMP)
SEWER DEPT
50 BILLERICA RD
CHELMSFORD MA 01824

GOODWIN, NICHOLAS &
GOODWIN, ALLISON
33 HOLT ST U-33
NO CHELMSFORD MA 01863

TYSON GLENN &
ALLISON GLENN
35 HOLT ST U-35
NO CHELMSFORD MA 01863

MCCOY DANIEL G TRUSTEE
MCCOY FAMILY REALTY TRUST
4 MCCOY AVE
NASHUA NH 03060

SPENCER DONALD
2 SHORE DR
NO CHELMSFORD MA 01863

KUNOBWA DAVID
12 MALLORY ST
NO CHELMSFORD MA 01863

WADE GRACE ANN
THOMAS L WADE
10 MALLORY ST
NO CHELMSFORD MA 01863

WADE GRACE ANN
THOMAS L WADE
10 MALLORY ST
NO CHELMSFORD MA 01863

WADE GRACE ANN
THOMAS L WADE
10 MALLORY ST
NO CHELMSFORD MA 01863

MANISCALCO ANTHONY J
DENISE LEE MANISCALO
6 MALLORY ST
NO CHELMSFORD MA 01863

CJ&C LLC
7 BRIDGE ST U-9
BILLERICA MA 01821

ALLARD SCOTT K &
JACQUELYN A ALLARD
11 MALLORY ST
NO CHELMSFORD MA 01863

MARCOTTE PHILLIP R &
CHRISTINE M MARCOTTE
7 MALLORY ST
NO CHELMSFORD MA 01863

MARCOTTE PHILIP R &
CHRISTINE M MARCOTTE
7 MALLORY ST
NO CHELMSFORD MA 01863

DANG MICHELLE &
DANG PETER
22 SHORE DR
NO CHELMSFORD MA 01863

JOHNSON ROBERT &
JOHNSON ROSEANNE
24 SHORE DR
NO CHELMSFORD MA 01863

SALVATI JAMES ROBERT &
KOHLMAN KATRINA ROSE
26 SHORE DR
NO CHELMSFORD MA 01863

KELLY TERRENCE
165 SEVENTH AV
LOWELL MA 01854

KELLY TERRENCE
165 SEVENTH AV
LOWELL MA 01854

KALOS GEORGE P &
ROSALIE J KALOS
13 GREEN VALLEY DR
CHELMSFORD MA 01824

MASSACHUSETTS ELECTRIC CO
% PROPERT TAX DEPT
40 SYLVAN RD
WALTHAM MA 02451-2286

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

QUINN BRIAN F & ELAINE QUINN
TRUSTEES
QUINN FAMILY TRUST
5 BRADEN ST
NO CHELMSFORD MA 01863

QUINN BRIAN F & ELAINE QUINN
QUINN FAMILY TRUST
5 BRADEN ST
NO CHELMSFORD MA 01863

LINSKEY CHARLES JR &
NORA J. SHERMAN
40 SHORE DR
NO CHELMSFORD MA 01863

BUTLER DAVID
JANET N BARTER
44A CLEVELAND ST
ARLINGTON MA 02174

LINSKEY CHARLES JR &
NORA J. SHERMAN
40 SHORE DR
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

QUINN BRIAN F & ELAINE QUINN
TRS
QUINN FAMILY TRUST
5 BRADEN ST
NO CHELMSFORD MA 01863

MANISCALCO ANTHONY J
DENISE LEE MANISCALO
6 MALLORY ST
NO CHELMSFORD MA 01863

FINNEGAN BLAIR J &
RONALD J LOISELLE
7 DORIS DR SUITE 7
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

MANISCALCO ANTHONY J
DENISE LEE MANISCALO
6 MALLORY ST
NO CHELMSFORD MA 01863

JOHNSON ROBERT &
JOHNSON ROSEANNE
24 SHORE DR
NO CHELMSFORD MA 01863

ONEIL TROY
13 COOLIDGE ST
NO CHELMSFORD MA 01863

SILVA JOSEPH TRUSTEE
OF JOSE & MARIA SPECIAL NEEDS
TRUST
85 GROTON RD
NO CHELMSFORD MA 01863

HOYT DANIEL D &
OIONG FU-
81 GROTON RD
NO CHELMSFORD MA 01863

HELLER OLIVER R
17 NEEDHAM ST
NO CHELMSFORD MA 01863

BUE JOSEPH D
ROBYN V BUE
15 NEEDHAM ST
NO CHELMSFORD MA 01863

BEZDENY SUZANNE TRUSTEE
OF BEZDENY FAMILY IRREV RE
TRUST
45 NEEDHAM ST
NO CHELMSFORD MA 01863

MACDONALD GLENN A &
LISA A MACDONALD
113 GROTON RD
NO CHELMSFORD MA 01863

TIENG SOTHEA & KAYACHITH
SOMLONG
HUON DION
97 GROTON RD
NO CHELMSFORD MA 01863

MAGIERA EMIL R &
MAGIERA DONNA M
105 GROTON RD
NO CHELMSFORD MA 01863

GEMBIS RAEANN
4 CAMPERS TR
NO CHELMSFORD MA 01863

WEST TIMOTHY T
WEST DANIELLE A
44 SHORE DR
NO CHELMSFORD 01863

MURRAY BARBARA MARIE
71 TWELFTH AV
NO CHELMSFORD MA 01863

MURRAY BARBARA MARIE
71 TWELFTH AV
NO CHELMSFORD MA 01863

MURRAY BARBARA MARIE
71 TWELFTH AV
NO CHELMSFORD MA 01863

KINNEY STEPHEN J &
BONITA MIGUEL-KINNEY
65 TWELFTH AV
NO CHELMSFORD MA 01863

BYRNE DIANE
47 ELEVENTH AV
NO CHELMSFORD MA 01863

BURKE ROGER H JR &
JOAN E
50 TWELFTH AV
NO CHELMSFORD MA 01863

O NEILL CHRISTOPHER
54 TWELFTH AV
NO CHELMSFORD 01863

ONEILL CHRISTOPHER
54 TWELFTH AV
NO CHELMSFORD MA 01863

LI ZHENFENG
WENYING PAN
60 TWELFTH AV
NO CHELMSFORD MA 01863

KUO BELLE
199 WILLIS DR
NO CHELMSFORD MA 01863

TRINH HANH TR
BUI LIEM TR
187 WILLIS DR
NO CHELMSFORD 01863

GARRIGAN EDWARD J
KAREN BOND GARRIGAN
185 WILLIS DR
NO CHELMSFORD MA 01863

BEVIS KAREN A
175 WILLIS DR
NO CHELMSFORD MA 01863

BEVIS KAREN A
175 WILLIS DR
NO CHELMSFORD MA 01863

CERNIGLIA GREGORY M TR &
CERNIGLIA JESSICA A KING TR
167 WILLIS DR
NO CHELMSFORD MA 01863

BYRNE DIANE
47 ELEVENTH AV
NO CHELMSFORD MA 01863

MOGREN PAUL &
TAMARA GAMBALE
17 WATERFORD PL
NO CHELMSFORD MA 01863

JONES BRENT W &
MARY K JONES
20 WATERFORD PL
NO CHELMSFORD, MA 01863

RAJADURAI JERUSAL &
JULIE JEGANATHAN
18 WATERFORD PL
NO CHELMSFORD MA 01863

SWENSON NIR N &
WHITNEY-SWENSON, SARAH B
16 WATERFORD PL
NO CHELMSFORD MA 01863

BABCOCK CHARLES &
ANNE MARIE BABCOCK
14 WATERFORD PL
NO CHELMSFORD MA 01863

ANOLI MELODY M TR
MMAM REVOC TRUST
12 WATERFORD PL
NO CHELMSFORD MA 01863

CASEY JAMES B JR &
DIM-CASEY DINA
10 WATERFORD PL
NO CHELMSFORD MA 01863

STRATTON JAMES F &
ROBERTA J DAVIDSON-STRATTON
8 WATERFORD PL
NO CHELMSFORD, MA 01863

COOMBES JAMIE D &
SUSAN M COOMBES
6 WATERFORD PL
NO CHELMSFORD MA 01863

BHOYAR AJEET V &
RAJESHREE A BHOYAR
157 WILLIS DR
NO CHELMSFORD MA 01863

MCCAULEY, RYAN P &
MCCAULEY, BRITTANY R
159 WILLIS DR
NO CHELMSFORD MA 01863

LOGAN, VIRGINIA F &
WOODBURY, SHIRLEY
283 GOLDEN BEAR DR
CARBONDALE CO 81623

WHITE GEOFFREY A TR
EIGHTH AVE REALTY TR
11 EIGHTH AV
NO CHELMSFORD 01863

STURGEON MICHAEL S
JULIEANN SAVLEN
7 EIGHTH AV
NO CHELMSFORD MA 01863

LE ADAM &
ANH N NGUYEN
1 EIGHTH AV
NO CHELMSFORD MA 01863

HILL CHRISTOPHER E SR &
DENISE M HILL
3 EIGHTH AV
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

SOUCY THOMAS
103 WILLIS DR
NO CHELMSFORD MA 01863

CLERMONT GAIL ANN
27 SEVENTH AV
NO CHELMSFORD MA 01863

GILBERT LAWRENCE S &
MAUREEN E CARON
89 WILLIS DR
NO CHELMSFORD MA 01863

GILBERT LAWRENCE S &
MAUREEN E CARON
89 WILLIS DR
NO CHELMSFORD MA 01863

CLERMONT GAIL A TR
GAIL A CLERMONT IRREVOC TRUST
27 SEVENTH AV
NO CHELMSFORD MA 01863

CLERMONT GAIL ANN
27 SEVENTH AV
NO CHELMSFORD MA 01863

REGAN ALEXANDRIA J &
JAMES S REGAN
23 SEVENTH AV
NO CHELMSFORD MA 01863

KEEFE DENNIS P &
LINDA R KEEFE
3939 LONG JOHN DR
PANAMA CITY FL 32405

CLERMONT KERRI A &
JUSTIN C LY
28 SEVENTH AV
NO CHELMSFORD MA 01863

FARRELL DARLENE A TR
MY GIFT TO YOU TRUST
31 SIXTH AV
NO CHELMSFORD MA 01863

KHALIL ADIL &
SYEDA SHAHEEN FATIMA
18 ONEIDA RD
ACTON MA 01720

DUBAY JOANNE
35 SIXTH AV
NO CHELMSFORD MA 01863

KHALIL ADIL &
SYEDA SHAHEEN FATIMA
18 ONEIDA RD
ACTON MA 01720

FARRELL DARLENE A TR
MY GIFT TO YOU TRUST
31 SIXTH AV
NO CHELMSFORD 01863

SIBLINGS IRREVOCABLE REALTY
TRUST
ANTHONY ANTONETTI TR
29 SIXTH AV
NO CHELMSFORD MA 01863

BARRINGTON EVAN TOM JR
LINDA A BARRINGTON
27 SIXTH AV
NO CHELMSFORD MA 01863

BARRINGTON EVAN TOM JR
LINDA A BARRINGTON
27 SIXTH AV
NO CHELMSFORD MA 01863

KEEFE DENNIS P &
LINDA R KEEFE
26 SEVENTH AVE
NO CHELMSFORD MA 01863

NISCHAN MELISSA &
KEVIN E TURNBAUGH
27 FIFTH AV
NO CHELMSFORD MA 01863

DONG SIZHONG
28 SIXTH AV
NO CHELMSFORD MA 01863

MYERSON, KAITLIN M &
MYERSON, SCOTT
34 6TH ST
NO CHELMSFORD MA 01863

MACKESSY GREGORY P &
KRISTINE T MACKESSY
36 SIXTH AV
NO CHELMSFORD MA 01863

BELANGER PHILIP O TRS
BELANGER LEONA M TRS
77 WILLIS DR
NO CHELMSFORD 01863

CHEVALIER FRANCOIS YVON &
DAWN GAY CHEVALIER
33 FIFTH AV
NO CHELMSFORD MA 01863

CLERMONT PAULINE I
34 FIFTH AV
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD, MA 01824

NISCHAN MELISSA &
KEVIN E TURNBAUGH
27 FIFTH AV
NO CHELMSFORD MA 01863

TRUDO JASON
20 FIFTH AV
NO CHELMSFORD MA 01863

DAIGLE ROLAND & LOUISE
30 FIFTH AV
NO CHELMSFORD MA 01863

DAIGLE ROLAND &
LOUISE M DAIGLE TRUSTEES
30 FIFTH AV
NO CHELMSFORD MA 01863

CLERMONT PAULINE I TRUST
PAULINE I CLERMONT TRUSTEE
34 FIFTH AV
NO CHELMSFORD MA 01863

SCOTT ROBERT G
48 NICHOLS ST
EVERETT MA 02149

SCOTT ROBERT G
48 NICHOLS ST
EVERETT MA 02149

NUNNERY JAMES W III &
KIMBERLY A NUNNERY
75 WILLIS DR
NO CHELMSFORD MA 01863

NUNNERY JAMES W III &
KIMBERLY A NUNNERY
75 WILLIS DR
NO CHELMSFORD MA 01863

NUNNERY JAMES W III &
KIMBERLY A NUNNERY
75 WILLIS DR
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

CLERMONT PAULINE I TRUST
PAULINE I CLERMONT TRUSTEE
34 FIFTH AV
NO CHELMSFORD MA 01863

CLERMONT PAULINE I TRUST
PAULINE I CLERMONT TRUSTEE
34 FIFTH AV
NO CHELMSFORD MA 01863

DAIGLE ROLAND &
LOUISE M DAIGLE
30 FIFTH AV
NO CHELMSFORD MA 01863

DAIGLE ROLAND & LOUISE
30 FIFTH AV
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD, MA 01824

DAIGLE ROLAND A & LOUISE M
30 FIFTH AV
NO CHELMSFORD MA 01863

VAUGHAN THOMAS F &
JANA J VAUGHAN
45 WILLIS DR
NO CHELMSFORD MA 01863

JEGATHEESAN KASTHURI &
PERIASAMY RAMESH
61 WILLIS DR
NO CHELMSFORD MA 01863

JEGATHEESAN KASTHURI &
PERIASAMY RAMESH
61 WILLIS DR
NO CHELMSFORD MA 01863

JEGATHEESAN KASTHURI &
PERIASAMY RAMESH
61 WILLIS DR
NO CHELMSFORD MA 01863

ANNIS RICHARD M &
JUDITH A ROSSI
65 WILLIS DR
NO CHELMSFORD MA 01863

SWANBECK WENDY
41 WILLIS DR
NO CHELMSFORD MA 01863

HARROW ROY S &
BONNIE J STEADMAN
72 WILLIS DR
NO CHELMSFORD MA 01863

GILBERT LAWRENCE S &
MAUREEN E CARON
89 WILLIS DR
NO CHELMSFORD MA 01863

JEON HEA YOUNG
JOUNG BO YOUNG
545 8TH ST
PALISADES PARK NJ 07650

GINGRAS RICHARD W &
JENNIFER L GINGRAS
11 THIRD AV
NO CHELMSFORD MA 01863

ANDERSON LAWRENCE J JR &
FRANCES M ANDERSON
7 THIRD AV
NO CHELMSFORD MA 01863

ANDERSON LAWRENCE J JR &
FRANCES M ANDERSON
7 THIRD AVE
NO CHELMSFORD MA 01863

ZUKOWSKI STEVEN D TR
ZUKOWSKI BRITTANY M
22 NEEDHAM ST
NO CHELMSFORD 01863

LOWENSTEIN CARROLL M TRUSTEE
OF FOURTH AVE REALTY TR
423 MYSTIC ST
ARLINGTON MA 02474

LEVASSEUR JUDITH
16 FIFTH AV
NO CHELMSFORD MA 01863

AYLWARD DONNA M TRUSTEE
20 FIFTH AV
NO CHELMSFORD MA 01863

LOUIE MATTHEW &
ZHANG-LOUIE ZOE
22 SEVENTH AV
NO CHELMSFORD MA 01863

ROLLO JANICE M
10 SEVENTH AV
NO CHELMSFORD 01863

MEIKLE ERIC A &
MEIKLE CARRIE S
16 SEVENTH AV
NO CHELMSFORD MA 01863

LOUIE MATTHEW &
ZHANG-LOUIE ZOE
22 SEVENTH AV
NO CHELMSFORD MA 01863

LOUIE MATTHEW &
ZHANG-LOUIE ZOE
22 SEVENTH AV
NO CHELMSFORD MA 01863

CAMIRE MAURICE J
MARGARET H CAMIRE
17 SEVENTH AV
NO CHELMSFORD MA 01863

CAMIRE MAURICE J
MARGARET H CAMIRE
17 SEVENTH AV
NO CHELMSFORD MA 01863

CAMIRE MAURICE J
MARGARET H CAMIRE
17 SEVENTH AV
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD, MA 01824

CHELMSFORD TOWN OF
50 BILLERICA RD
CHELMSFORD MA 01824

LEBVASSEUR DAVID A &
JUDITH FAIRBROTHER
1 SEVENTH AV
NO CHELMSFORD MA 01863

LEVASSEUR DAVID A &
JUDITH FAIRBROTHER
1 SEVENTH AV
NO CHELMSFORD MA 01863

AKTAR RAHANA
AHSAN ABUL
48 NEEDHAM ST
NO CHELMSFORD 01863

RICCIO CHRISTOPHER M &
MICHELLE RICCIO TRS
CHRISTOPHER & MICHELLE RICCIO
REV TRUST
4 EIGHTH AV

BAROT KETUL &
GANATRA SONALI
6 EIGHTH AV
NO CHELMSFORD MA 01863

RAFFONI CHARLES ANTHONY
21 SEVENTH AV
NO CHELMSFORD MA 01863

RAFFONI CHARLES ANTHONY
21 SEVENTH AV
NO CHELMSFORD MA 01863

RAFFONI CHARLES ANTHONY
21 SEVENTH AV
NO CHELMSFORD MA 01863

RAFFONI CHARLES ANTHONY
21 SEVENTH AV
NO CHELMSFORD MA 01863

RAFFONI CHARLES A
21 SEVENTH AV
NO CHELMSFORD MA 01863

FURTADO MICHELE MARY
6 WILLIS DR- P O BOX 65
NO CHELMSFORD MA 01863

WHITE DOROTHY
35 WILLIS DR
NO CHELMSFORD MA 01863

JEGATHEESAN KASTHURI &
PERIASAMY RAMESH
61 WILLIS DR
NO CHELMSFORD MA 01863

DUNN DAVID WALTER &
WANDA LEE DUNN TRUSTEES
60 WILLIS DR
NO CHELMSFORD MA 01863

HARROW ROY S &
BONNIE J STEADMAN
72 WILLIS DR
NO CHELMSFORD MA 01863

HARROW ROY S &
BONNIE J STEADMAN
72 WILLIS DR
NO CHELMSFORD MA 01863

LACOURSE ROSEMARY
18 NEEDHAM ST
NO CHELMSFORD MA 01863

LACOURSE ROSEMARY
18 NEEDHAM ST
NO CHELMSFORD MA 01863

MAHONEY RICHARD F &
MAHONEY LINDA
16 THIRD AV
NO CHELMSFORD MA 01863

LACOURSE ROSEMARY
18 NEEDHAM ST
NO CHELMSFORD MA 01863

MCCARRON TIMOTHY K &
MCCARRON JOANNE M
7 FIRST AV
NO CHELMSFORD MA 01863

COTE ANN
31 WILLIS DR
NO CHELMSFORD MA 01863

ADLEY RHETT
29 WILLIS DR
NO CHELMSFORD 01863

MCCARRON TIMOTHY K &
JOANNE M MCCARRON
7 FIRST AV
NO CHELMSFORD MA 01863

KASILOWSKI MARCIA
14 NEEDHAM ST
NO CHELMSFORD MA 01863

JOSHUA A BONDESON
10 NEEDHAM ST
NO CHELMSFORD MA 01863

DAIGLE ISAAC J &
DAIGLE CHRISTINA P
4 FIRST AV
NO CHELMSFORD MA 01863

DINH THIEN Q &
HUOT LEMAR
25 WILLIS DR
NO CHELMSFORD MA 01863

MUIR JOHN R
KRISTEN MUIR
19 WILLIS DR
NO CHELMSFORD MA 01863

HASSAN MOHAMED A &
METRAKAS KATERINA I
114 GROTON RD
NO CHELMSFORD MA 01863

MUIR THOMAS A
LOUISE M MUIR
118 GROTON RD
NO CHELMSFORD MA 01863

GREGOIRE CHRISTOPHER J &
REBECCA A GREGOIRE
120 GROTON RD
NO CHELMSFORD MA 01863

WIRTH ALAN
6 NEEDHAM ST
NO CHELMSFORD MA 01863

CHELMSFORD TOWN OF
CONSERVATION COMMISSION
50 BILLERICA RD
CHELMSFORD MA 01824

Update of the Freeman Lake Diagnostic and Management Assessment

Project No. 557159.0000.0000

March 2025

Prepared For:

Town of Chelmsford
Department of Public Works
50 Billerica Road
Chelmsford, MA 01824

Prepared By:

TRC
650 Suffolk St Suite 200
Lowell, MA 01854

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1.0 Introduction

TRC provides this Diagnostic and Lake Management Assessment for Freeman Lake to the Town of Chelmsford (Town). Freeman Lake, also known as Newfield Pond, is an approximately 77-acre waterbody located in the Stony Brook sub watershed of the Merrimack River watershed. The lake has a complex history involving diversions and dam failures that have shaped its current state.

Freeman Lake was last comprehensively studied under the Freeman Lake Diagnostic and Management Assessment (Worden 1995). The diagnostic portion of this study indicated that the lake was not in a severely degraded state and still had value as a recreational resource for the Town. However, nuisance growth of non-native Eurasian milfoil (*Myriophyllum spicatum)* and fanwort (*Cabomba caroliniana)* had led to excess vegetative growth in the lake. Additionally, declining water clarity, beach-closing levels of coliform bacteria, and increased frequency of summer fish kills pointed toward declining water quality.

With regard to sources, Worden's (1995) diagnostic assessment concluded that diversions of water from Stony Brook contributed the vast majority of both hydrologic (94%) and phosphorus (88%) budgets of the lake and were likely to play a substantial role in several of the emerging management issues. For instance, the Stony Brook diversion was identified as probably being responsible for introduction of the two non-native aquatic plant species, which are both known to spread via fragmentation. Additionally, nutrients from the Stony Brook diversion, septic systems, road runoff, direct runoff from lawns, and erosion were identified as fueling high levels of phytoplankton growth, which was in turn likely responsible for both low water clarity and fish kills. Finally, the diagnostic assessment attributed excessive levels of coliform bacteria to both the Stony Brook diversion and resident Canada Goose (*Branta canadensis*) populations within the Varney Playground area.

Worden's (1995) management assessment recommended the use of both watershed and in-lake management approaches. Among the watershed techniques, increased diversion from Stony Brook was recommended to enhance flushing of the lake. Route 40 stormwater management, Canada Goose control, vegetated buffer strips, and shoreline road and haybale maintenance were also recommended. Recommended in-lake management techniques included shoreline stabilization by lowering the level of the lake, as well as nuisance aquatic plant control through mechanical harvesting, benthic barriers, and herbicide treatments.

In 2018, SOLitude Lake Management (SOLitude) mapped aquatic vegetation in Freeman Lake and found that the list of non-native species had increased to include both brittle naiad (*Najas minor*) and curly-leaf pondweed (*Potamogeton crispus*), in addition to Eurasian milfoil and fanwort. SOLitude recommended an herbicide management program. Specifically, an initial whole-lake treatment with the systemic herbicide fluridone (trade name Sonar) was recommended for the first year of management and anticipated to provide two to three years of target species control. SOLitude also recommended the use of contact herbicides, including diquat and flumioxazin for spot treatments to keep future regrowth of target species under control.

In 2023, the Town contracted TRC to provide an update of the Freeman Lake Diagnostic and Management Assessment. This report presents the diagnostic approach and findings, as well as the management assessment and recommendations that resulted from this effort.

2.0 Diagnostic Assessment

2.1 Watershed

As indicated in Worden (1995), the Freeman Lake watershed actually consists of both a local watershed and a much larger watershed associated with the diversion from Stony Brook. For this purposes of the current study, these will be referred to as the local sub-watershed and the Stony Brook sub-watershed going forward. Worden estimated that the natural watershed for Freeman Lake was approximately 400 acres in size but that the local sub-watershed would also include another 213 acres of direct drainage to the Stony Brook diversion channel, leading to a total local sub-watershed area of 613 acres. Although he did not provide an area for the Stony Brook sub-watershed, he suggested that inclusion of this sub-watershed resulted in an increase of the Freeman Lake watershed area by more than 81 times its original size (i.e., a total watershed area greater than 32,400 acres).

To develop more accurate delineations of the contributing watersheds, TRC used the Massachusetts StreamStats application (USGS 2024). The combined watershed was delineated first, which yielded a total watershed of size approximately 27,405 acres. Next, the Stony Brook sub-watershed was delineated from the location of the diversion structure downstream of the School Street Bridge. The area of this sub-watershed is approximately 26,816 acres. Subtracting this from the total watershed yields the area of the local sub-watershed, which is approximately 589 acres. The local and Stony Brook sub-watersheds are depicted in **Figure 1**.

2.2 Land Use

Worden (1995) did not explicitly map land use in the local or Stony Brook sub-watersheds. However, he indicated that areas in the local watershed zoned for residential development had nearly reached their build-out potential at that time. Therefore, it is anticipated that land use changes from 1995 to present day have been minor in the local sub-watershed.

The local sub-watershed is currently co-dominated by forest and developed land uses, each of which account for approximately 41% of the area (**Table 1**). Route 3 comprises a sizable portion of the developed area within the local sub-watershed. Freeman Lake and other water bodies constitute 14% of the area, while wetlands account for 4% and other undeveloped land rounds out the final 1%.

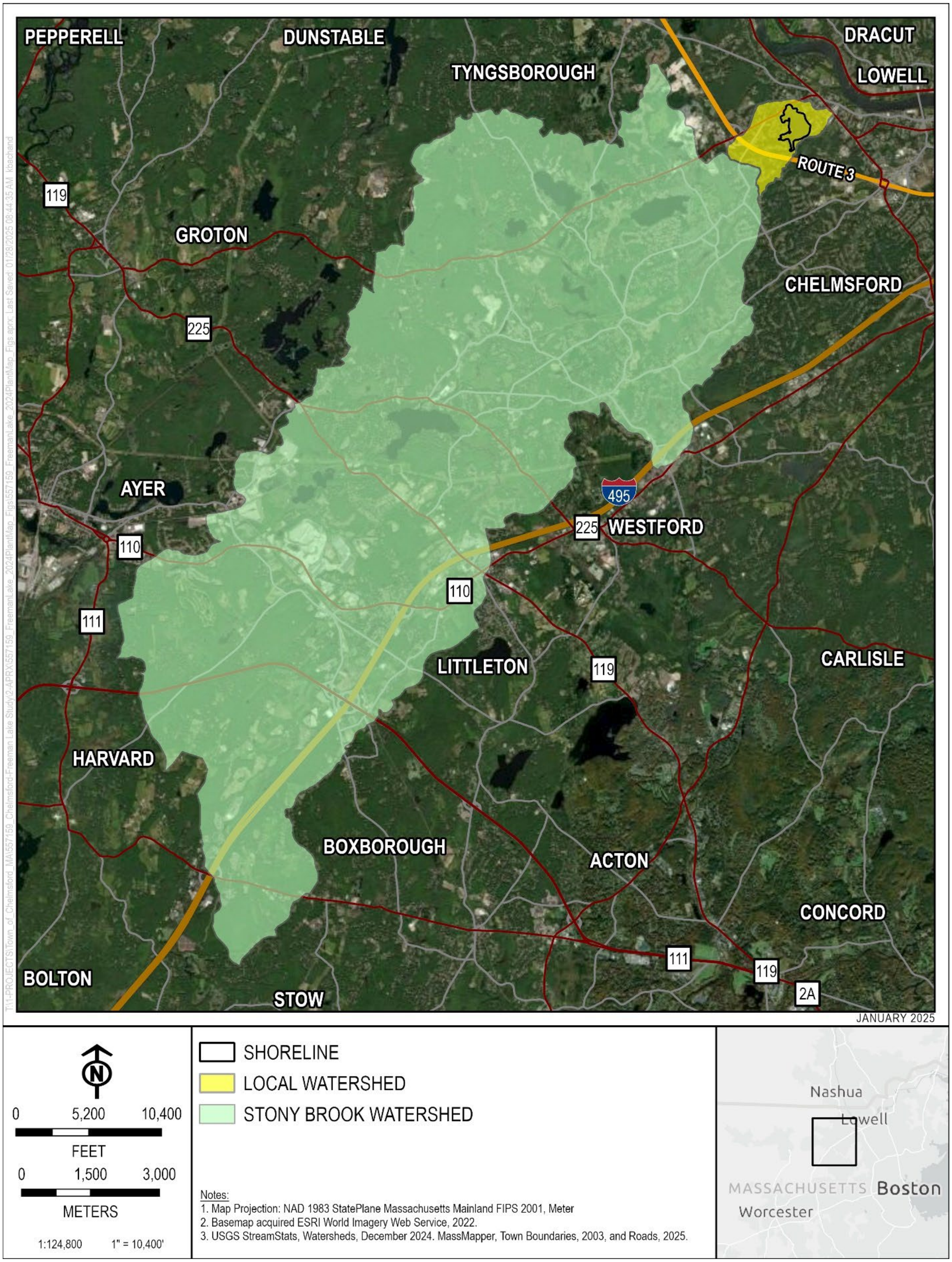

Figure 1. Watershed Delineation

In contrast, the Stony Brook sub-watershed is more heavily forested (53%) and less developed (22%, **Table 1**). Wetlands (15%), other undeveloped land (4%), and agriculture (2%) occupy a higher portion of this sub-watershed, while water takes up a much smaller percentage (4%).

Overall land use in the combined watershed is depicted in **Figure 2**.

Table 1. Land Use in the Local and Stony Brook Sub-Watersheds

Land Use	Local Sub-Watershed		Stony Brook Sub-Watershed		Total	
	Acres	%	Acres	%	Acres	%
Agriculture	0	0	515	2	515	2
Forest	239	41	14,333	53	14,572	53
Wetland	21	4	4,029	15	4,050	15
Other Undeveloped	8	1	1,150	4	1,158	4
Developed	239	41	5,843	22	6,082	22
Water	82	14	946	4	1,028	4
Total	**589**	**100**	**26,816**	**100**	**27,405**	**100**

2.3 Bathymetry

Worden (1995) conducted a bathymetric survey as part of the original Freeman Lake Diagnostic and Management Assessment. Although the author indicated that soundings were taken with a lead line to accurately measure depth through thick aquatic plant beds, the lateral position of each sounding was estimated using shoreline features and landmarks. The map generated from this survey depicted three-foot contours of water depths at normal pool elevation (i.e., the elevation at which water begins to flow over the spillway).

The Worden bathymetry map was the most recent until the Massachusetts Division of Fisheries and Wildlife (DFW) released an updated map in 2024 (**Figure 3**). Although the DFW map depicts contours at a coarser interval (five feet), it is based on thousands of soundings with coordinates that were mapped with GPS accuracy. It is therefore considered to be the most accurate depiction of water depths in the lake and was used as the basis for water depth and volume-related data used in the current study.

Based on the DFW bathymetry, the maximum depth of Freeman Lake is estimated to be approximately 26 ft (7.9 m), with an average depth of 11.9 ft (3.6 m). At normal pool elevation, the lake is estimated to have an area of 81.8 acres. This yields a lake volume of approximately 317 million gallons (1.2 billion liters).

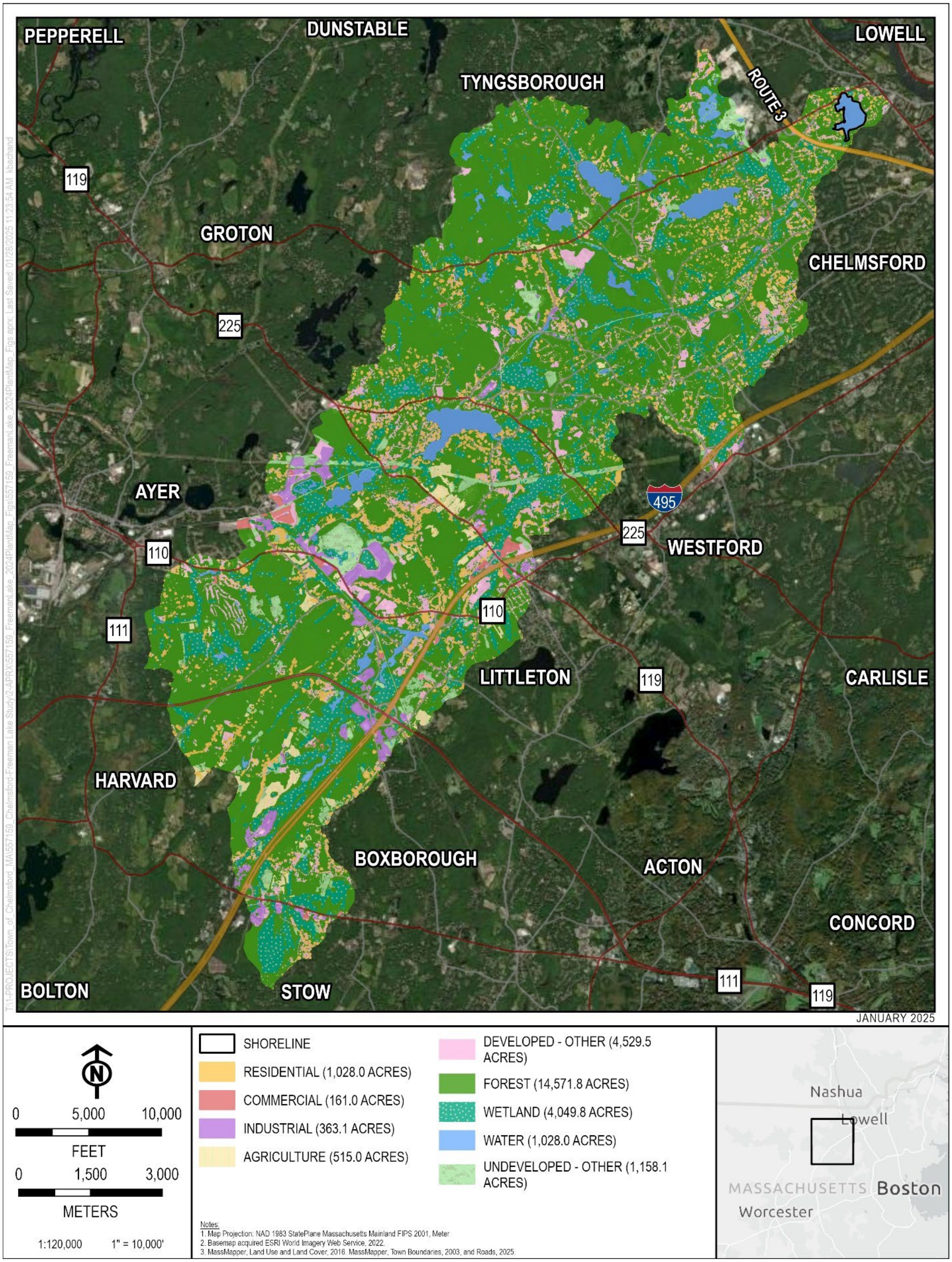

Figure 2. Watershed Land Use

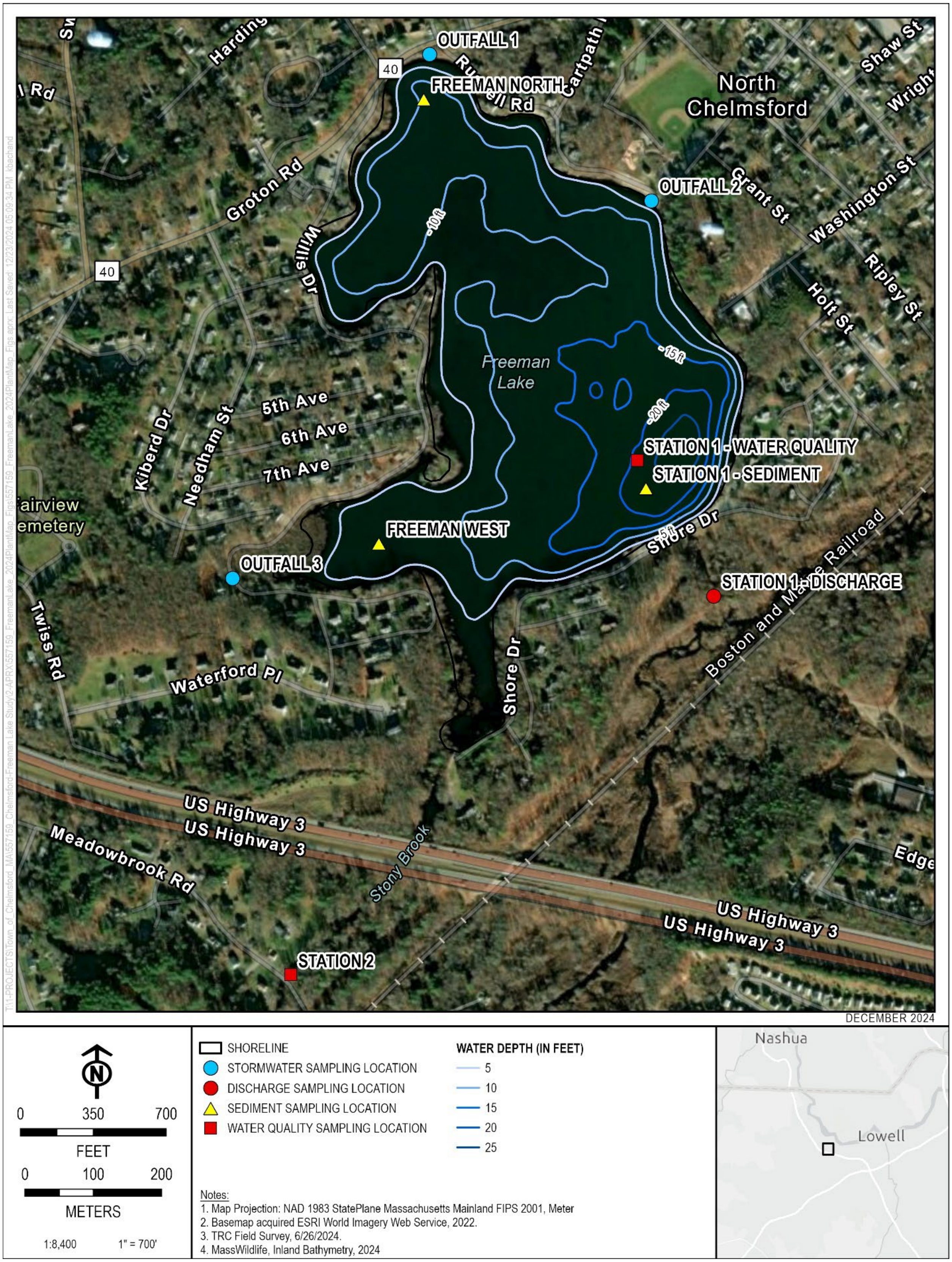

Figure 3. Sampling Locations and Bathymetry Contours

2.4 Limnological Data

To support the diagnostic assessment of Freeman Lake, limnological data was collected over the period of one year, commencing in late October 2023 and ending in early October 2024.

This included collection of the following:

- Water quality measurements and samples from the lake and its inflows, including both the Stony Brook diversion and stormwater outfalls.
- Discrete and continuous hydrologic measurements from the Stony Brook diversion and outlet from Freeman Lake.
- Sediment core samples from three in-lake locations.
- In-lake plankton samples, including both zooplankton and phytoplankton.

Sampling locations for each of these are depicted in **Figure 3**.

Stream and in-lake water quality and plankton data were collected during six events, stormwater outfall data was collected for a single storm event, discrete hydrologic measurements were collected during seven events, and sediment core samples were collected once. The timeline of limnological data collection is presented below:

- October 26, 2023 – Water quality and plankton sampling. Collection of discrete hydrologic measurements.
- October 30, 2023 – Installation of continuous water level data loggers. Collection of discrete hydrologic measurements.
- April 16, 2024 – Water quality and plankton sampling. Collection of discrete hydrologic measurements.
- April 30, 2024 – Sediment sampling.
- May 30, 2024 – Water quality and plankton sampling. Collection of discrete hydrologic measurements. Wet weather sampling of stormwater outfalls.
- June 26, 2024 – Water quality and plankton sampling. Collection of discrete hydrologic measurements.
- August 8, 2024 – Water quality and plankton sampling. Collection of discrete hydrologic measurements.
- October 2, 2024 – Water quality and plankton sampling. Collection of discrete hydrologic measurements. Removal of and final data download from continuous water level data loggers.

More detailed descriptions of the sampling approach and results for each type of limnological data collection are presented in the following sections.

2.4.1 *Water Quality*

2.4.1.1 Approach

The primary water quality sampling program at Freeman Lake was implemented from April 2024 through October 2024. However, a single initial sampling event was also conducted in October 2023 at the request of the Town. During each sampling event, water quality parameters were measured in the field and samples were collected for laboratory analysis from the surface and bottom of the deep hole (Station 1) as well as from the Stony Brook diversion channel (Station 2) (**Figure 3**).

Some in-lake parameters were measured at one-meter intervals throughout the water column while others were only collected at the surface or bottom of the lake. In-lake grab samples were collected using a van Dorn sampling bottle to obtain water at discrete depths.

Additionally, water quality data was also collected during one wet weather event at three stormwater outfalls. In concert with the Town, TRC selected four stormwater outfalls that discharge into Freeman Lake for potential sampling. Of the four potential locations selected, Outfall 1 (“North” - Route 40), Outfall 2 (“East” - Varney Park/Freeman Lake Beach) and Outfall 3 (“Northwest” – Willis Drive) were flowing into the lake at the time of sampling. The intent of the outfall sampling was to measure pollutant loading from the Local Sub-Watershed to Freeman Lake during a representative wet weather event. Samples were collected from a targeted rain event with a magnitude of greater than 0.25 inches.

Laboratory-analyzed samples were submitted to a state-certified analytical laboratory – either Phoenix Environmental Laboratories or Alpha Analytical Laboratory (now Pace Analytical Services). A summary of the water quality parameters measured or collected as part of the Freeman Lake Diagnostic and Management Assessment is provided in **Table 2**.

Table 2. Summary of Water Quality Data Collection

Water Quality Parameter	Laboratory	In-Lake (Station 1) Full Water Column	In-Lake (Station 1) Surface	In-Lake (Station 1) Bottom	Stony Brook Diversion (Station 2)	Stormwater Outfalls 1 -3
Temperature	Field	●	●	●	●	
Dissolved Oxygen	Field	●	●	●	●	
Specific Conductance	Field	●	●	●	●	
pH	Field	●	●	●	●	
Secchi Disk Transparency	Field		●			
Phycocyanin*	Field		●			
Total Phosphorus	Phoenix		●	●	●	●
Soluble Reactive Phosphorus*	Phoenix		●	●	●	
Total Kjeldahl Nitrogen	Phoenix		●	●	●	●
Nitrate-Nitrogen	Phoenix		●	●	●	●
Ammonia-Nitrogen	Phoenix		●	●	●	●
Alkalinity	Phoenix		●	●	●	●
Total Suspended Solids*	Phoenix		●	●	●	
Fecal Coliform	Alpha/Pace		●		●	●

Water Quality Parameter	Laboratory	In-Lake (Station 1) Full Water Column	In-Lake (Station 1) Surface	In-Lake (Station 1) Bottom	Stony Brook Diversion (Station 2)	Stormwater Outfalls 1 -3
E. coli	Alpha/Pace		●		●	
Chlorophyll a	Alpha/Pace		●		●	

*Added to scope after the initial sampling round, based on stakeholder input. Data collection for these parameters began in April 2024.

2.4.1.2 Results

Results are summarized in the following sections, which are divided by location type (in-lake, streams, stormwater outfalls). Laboratory reports are provided in **Appendix A**.

2.4.1.2.1 In-Lake

<u>Water Temperature</u>

Water temperature in Freeman Lake followed a typical seasonal cycle for a temperate lake (**Figure 4**). Cool, well-mixed conditions were observed in late October 2023 and April 2024 with nearly identical temperatures at the surface and bottom of the lake (isothermal conditions). This was followed by warmer, thermally stratified conditions from May to early October 2024. Vertical stratification occurs because warm water is less dense than cool water. As air temperature and sun angle increases in the spring, so do surface water temperatures. This results in distinct temperature layers at the top and bottom of the water column. When thermal stratification occurs, cool water at the bottom of the lake is largely trapped beneath the warm layer with little physical exchange between the top (epilimnion) and bottom (hypolimnion) layers. The greater the difference in temperature, the stronger the stratification.

In 2024, the thermal stratification of Freeman Lake was strongest from May to August. Peak surface temperatures were observed in June and August – approximately 26°C (78.8°F) during both visits, contrasting with 13°C (55.4°F) temperatures in bottom waters. By early October, some thermal stratification remained but in a weaker state (i.e., with much less difference between surface and bottom temperatures), suggesting that full vertical turnover (mixis) of the lake was imminent.

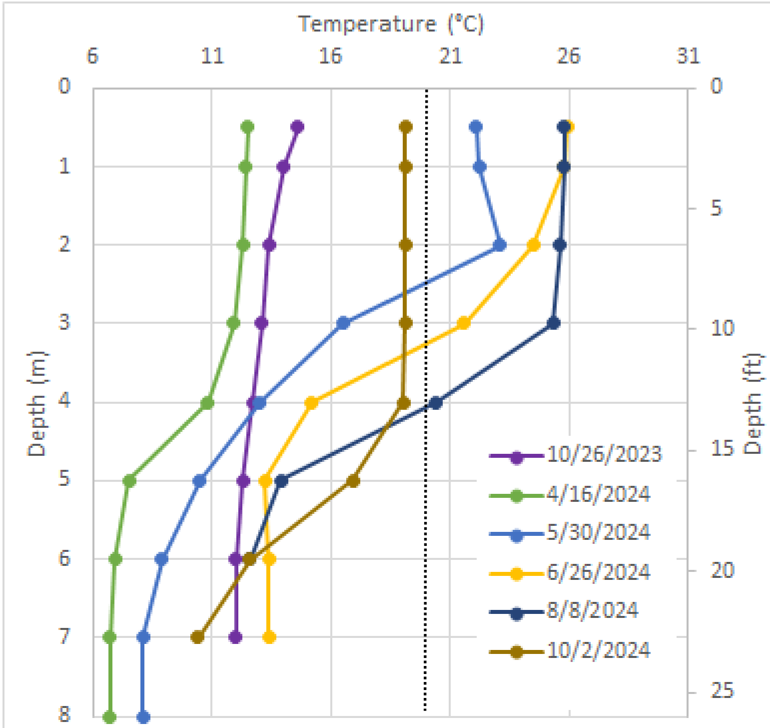

Figure 4. Temperature Profiles from Station 1
Dotted line indicates approximate upper end of temperature preference for growth and reproduction of coldwater fish species (e.g., trout).

These results are generally consistent with the findings of Worden (1995) and MassDEP (1993).

<u>Dissolved Oxygen</u>

Dissolved oxygen is a measure of oxygen gas dissolved in water and is essential for aerobic respiration by aquatic life. Oxygen solubility in water decreases with increased water temperature and varies with barometric pressure and salinity. Therefore, dissolved oxygen can be measured as both a raw concentration and as a percentage of saturation.

Dissolved oxygen concentrations in Freeman Lake followed a typical seasonal cycle for a temperate lake (**Figure 5**). All other factors aside, a decrease in dissolved oxygen concentrations would be expected as temperatures increase during the summer and solubility decreases. However, the vertical profile shapes also change over time, with much less dissolved oxygen in bottom waters from May to early October 2024 than in surface waters. In each of these months, a substantial portion of the bottom waters of Freeman Lake drop into hypoxic (low oxygen – below 5 mg/L) conditions. Persistent hypoxia is not considered to be supportive of most aquatic life, including fish and aquatic invertebrates. In May, hypoxic conditions were observed in waters deeper than approximately 4 m (13 ft). However, conditions in June were the starkest observed, with hypoxia as shallow as 2.5 m (8 ft) and anoxia (a more severe condition characterized by very low or no oxygen) in waters deeper than approximately 4 m (13 ft). Interestingly, a thin layer of

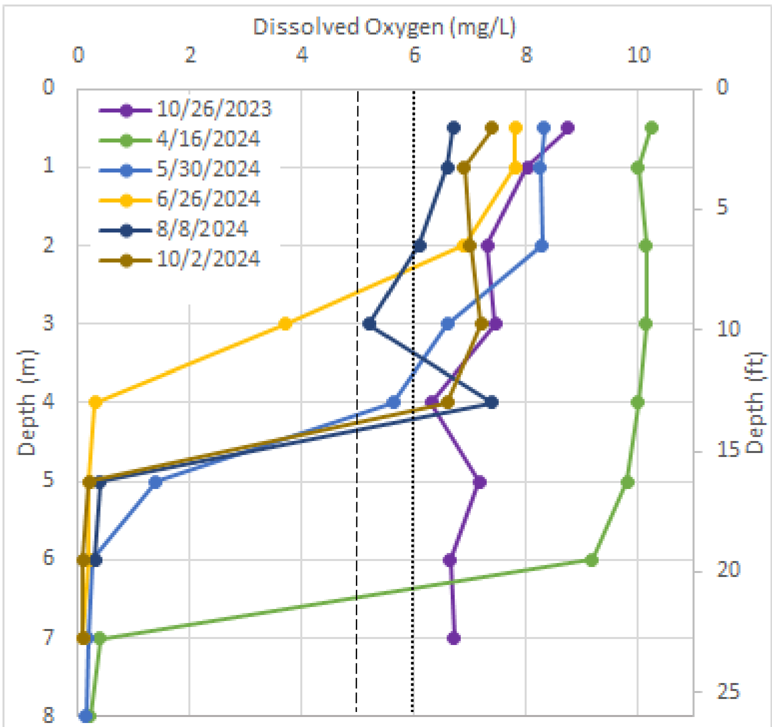

Figure 5. Dissolved Oxygen Concentrations at Station 1
Dashed line indicates state standard of 5.0 mg/L for warmwater fisheries. Concentrations below this line are considered hypoxic. Thick, dotted line indicates state standard of 6.0 mg/L for coldwater fisheries.

well oxygenated water appeared at mid-depth in August, perhaps indicating a thin lens of concentrated phytoplankton growth in this part of the water column

In addition to concentration, dissolved oxygen can also be expressed in the form of percent saturation. This provides a measure of how much oxygen is dissolved in water relative to the amount it can nominally hold in solution. As such, it allows for dissolved oxygen measurements to be compared across temperature conditions. Results indicate similar percent saturation levels in the shallowest surface waters from April to June (**Figure 6**), despite the fact that concentrations fell from more than 10 mg/L in April to 8 mg/L in June (**Figure 5**). However, the pattern in bottom hypolimnetic water results differed only minimally between dissolved oxygen concentration and percent saturation.

The depletion of dissolved oxygen from bottom waters of Freeman Lake is tied to thermal stratification, in that as bottom waters become cut off from surface circulation, they also lose their primary source of oxygen replenishment. If oxygen demand (by biological and chemical processes) is high in bottom waters, dissolved oxygen will be rapidly depleted under thermally stratified conditions. Hypoxia and/or anoxia will in bottom waters persist until seasonal turnover in the autumn allows oxygen to be reintroduced into bottom waters. The results from Freeman Lake indicate that oxygen demand is high, which creates a large volume of oxygen-poor water in the bottom portion of the lake from late spring until early autumn. As a result, most aquatic life cannot survive in deeper waters of Freeman Lake through the summer. Although Freeman Lake is not a coldwater fisheries resource, as defined by the Massachusetts Division of Fisheries and Wildlife, it could not support holdover trout through the summer because there is no portion of the lake that meets both their temperature (generally less than 20°C [68°F]) and dissolved oxygen (6 mg/L or more) requirements from approximately May to August.

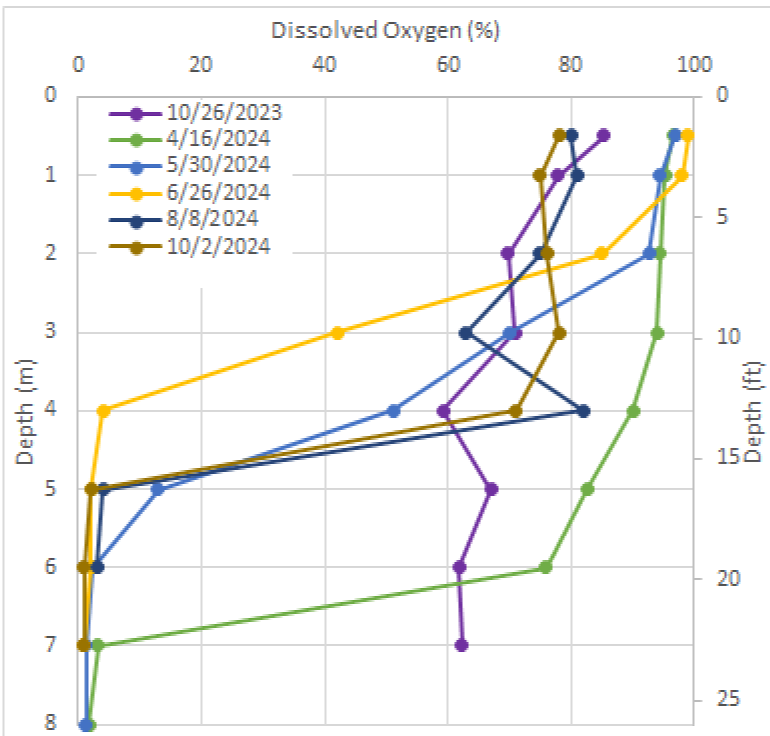

Figure 6. Dissolved Oxygen Percent Saturation at Station 1

These results are generally consistent with the findings of Worden (1995) and MassDEP (1993).

<u>Specific Conductance</u>

Specific conductance is a measure of electrical conductivity in the water and is standardized to a temperature of 25°C (77°F). Although specific conductance can be affected by the presence of any charged materials in the water, it is most responsive to dissolved salts and typically tracks with salinity.

In-lake specific conductance ranged from 368 µS/cm to 500 µS/cm and demonstrated a steady upward trend at all depths from April to October 2024 (**Table 3**). Specific conductance was also typically highest in bottom waters.

pH

The measurement of pH is used to determine the degree to which water is acidic or basic. The pH scale extends from 0 (strongly acidic) to 14 (strongly basic) with 7 being neutral. The pH of most natural waters in the region falls near the middle of the scale (circumneutral), although it can vary by season or even on a diel basis, especially in poorly buffered waters.

Measured pH levels at the Station 1 surface and bottom sampling locations, in Freeman Lake, were generally circumneutral (i.e., pH near 7.0) over the study period. The lowest pH was 6.56, observed at the Station 1 surface location during the April sampling event and the highest pH was 7.63 at the Station 1 surface location during the August sampling event (**Table 3**).

Turbidity

Turbidity is a measure of water clarity as sensed by the scattering of light through water. Colloidal and suspended materials in the water column raise turbidity. Turbidity is affected by the size, shape, color, and concentration of materials in water and has an inverse relationship with transparency.

Turbidity levels at the Station 1 surface and bottom sampling locations ranged from 0.5 NTU at the surface location in August, to 4.03 NTU at the bottom location in April (**Table 3**). Turbidity readings were generally around, or less than 3.0 NTU over the course of the study period in Freeman Lake.

Secchi Disk Transparency

Secchi depth is a measure of water transparency made using a Secchi disk lowered into the water until it disappears. Secchi depth can be reduced by suspended sediments, algal growth, water coloration, or the presence of other organic matter in the water column. Reduced Secchi depths are typically associated with nutrient-enriched lakes.

At Freeman Lake, Secchi depth readings ranged from a minimum of 1.5 meters in October and to a maximum of 2.5 meters in June (**Table 3**) over the course of the study period.

Phycocyanin

Phycocyanin is a photosynthetic pigment (similar to chlorophyll) used by freshwater cyanobacteria. Because phycocyanin is specific to cyanobacteria, it can be used to track trends in cyanobacteria separate from the overall algal community.

At Freeman Lake, phycocyanin was detected at low levels in spring but increased in summer and remained at higher levels in early autumn (**Table 3**). Phycocyanin was sometimes higher in bottom waters than at the surface. These observed patterns are not unusual; cyanobacteria typically reach maximum densities when water temperatures are warm and usually peak after other species of algae begin to decline. Additionally, many cyanobacteria can adjust their buoyancy in the water column and, depending on metabolic needs, rise to enhance photosynthesis or sink to better access bioavailable nutrients.

Table 3. Field-Measured Water Quality Results, Freeman Lake Station 1, 2023-2024

Date	Location	Temp (°C)	DO (mg/L)	DO (%)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)	Secchi Depth (m)	Phyco-cyanin (RFU)
10/26/23	Surface	14.6	8.75	85.4	388	7.09	NS	1.5	NS
	Bottom	12.0	0.16	1.4	405	7.18	NS	-	NS
4/16/24	Surface	12.5	10.24	96.5	369	6.56	2.87	2.25	10
	Bottom	6.7	0.22	1.7	386	7.16	4.03	-	4
5/30/24	Surface	22.1	8.33	95.8	418	7.75	0.56	1.75	15
	Bottom	8.1	0.13	1.1	443	6.60	1.37	-	19
6/26/24	Surface	25.9	7.8	99.0	436	7.14	0.28	2.5	47
	Bottom	13.4	0.1	1.0	432	6.65	0.77	-	31
8/08/24	Surface	25.8	6.7	80.1	444	7.63	0.5	1.75	34
	Bottom	12.6	0.3	3.0	487	7.32	2.80	-	199
10/02/24	Surface	19.1	7.4	77.9	451	7.20	1.76	1.5	46
	Bottom	10.4	0.1	1.0	500	6.92	2.52	-	23

<u>Nutrients</u>

High levels of nutrients (e.g., nitrogen and phosphorus) in the water column can lead to undesirable biological consequences. For example, floating plants like duckweed and watermeal may grow to excessive levels when soluble inorganic nitrogen (e.g., nitrate, ammonia) and phosphorus are present at high concentrations. Likewise, high levels of these nutrients may also trigger excessive algal growth, leading to bloom conditions and, under certain conditions, dominance by toxigenic species of cyanobacteria. Overall, phosphorus tends to be the limiting nutrient in freshwater ponds while nitrogen is more likely to be limiting in brackish or salt waters. However, this may vary over time in the same water body. When nitrogen becomes the limiting nutrient, certain nitrogen-fixing cyanobacteria may be favored because they can generate their own nutrients from atmospheric nitrogen (e.g., *Aphanizomenon flos-aquae* and *Dolichospermum* spp., all of which were observed in Freeman Lake).

Total phosphorus concentrations averaged 0.030 mg/L during the monitoring period. Bottom concentrations were typically higher than surface, except for the highest total phosphorus value, which was observed at the surface of Freeman Lake in October 2024 (**Table 4**). Soluble reactive phosphorus (SRP) was sampled during each event from May to October 2024 but was not detected. SRP is highly bioavailable and reactive, so the lack of detection (despite the high total phosphorus concentrations) suggests that competition for available phosphorus is intense at Freeman Lake.

Table 4. Laboratory Water Quality Results, Freeman Lake Station 1, 2023 – 2024

Date	Location	SRP (mg/L)	Total P (mg/L)	Nitrate (mg/L)	Ammonia (mg/L)	TKN (mg/L)	Chl a (mg/m^3)	TSS (mg/L)	Alk. (mg/L)	Fecal Col. (col/ 100mL)	E coli (col/ 100 mL)
10/26/23	Surface	NS	0.022	0.14	0.13	0.44	NS	NS	32	15.0	NS
	Bottom	NS	0.030	0.16	0.19	0.59	NS	NS	33	NS	NS
4/16/24	Surface	NS	0.018	0.23	<0.05	0.22	NS	NS	25	2.0	NS
	Bottom	NS	0.049	0.27	0.07	0.67	NS	NS	24	NS	NS
5/30/24	Surface	<0.01	0.021	0.12	0.08	0.49	19.3	<5.0	32	5.0	NS
	Bottom	<0.01	0.035	0.14	0.24	0.89	NS	< 3.3	32	NS	NS
6/26/24	Surface	<0.01	0.016	0.03	0.13	0.64	4.06	<5.0	37	<2.0	<2.0
	Bottom	<0.01	0.027	0.04	0.18	0.72	NS	<10	36	NS	NS
8/08/24	Surface	<0.01	0.019	<0.02	0.08	0.54	8.80	3.6	38	2.0	7.0
	Bottom	<0.01	0.035	<0.02	0.07	0.95	NS	4.8	46	NS	NS
10/02/24	Surface	<0.01	0.052	<0.02	0.08	0.52	11.7	<2.5	33	25	25
	Bottom	<0.01	0.037	<0.02	1.21	1.65	NS	3.3	65	NS	NS

NS=not sampled

Although this study did not include measurement of total nitrogen, it can be approximated by the sum of nitrate-nitrogen and total Kjeldahl nitrogen (TKN) in most surface waters because nitrite-nitrogen is rarely detectable. Using this approximation, total nitrogen averaged 0.71 mg/L in Freeman Lake over the course of this study. Except for the surface sample in April, the bulk of nitrogen was in the form of TKN, which includes both ammonia and organic nitrogen.

Nitrate and ammonia are the most bioavailable forms of nitrogen, while organic nitrogen, especially that bound in particulate organic matter is less so. Organic nitrogen, though not measured directly by this study, can be estimated by subtracting ammonia from TKN. Elemental nitrogen, found in our atmosphere as nitrogen gas, is not readily bioavailable but can be converted to metabolizable nitrogen by certain organisms, including nitrogen-fixing cyanobacteria.

Nitrate concentrations at Freeman Lake averaged 0.10 mg/L and ranged as high as 0.27 mg/L (**Table 4**). However, nitrate was not detectable at all times, such as in August and October 2024. TKN concentrations averaged 0.69 mg/L but ranged as high as 1.65 mg/L at the bottom of Freeman Lake in October 2024. The highest concentration of TKN was also accompanied by the highest value of ammonia observed during the study (1.21 mg/L).

<u>Chlorophyll a</u>

Algal density is inferred by measuring the fluorescence of chlorophyll a, a pigment found in algal cells. High chlorophyll a levels are associated with elevated total algal production.

At Freeman Lake, chlorophyll a was detected in every sample analyzed (**Table 4**). Average chlorophyll a was 11.0 mg/m^3, although it was as high as 19.3 mg/m^3 in May. While there are no statewide standards for chlorophyll a, MassDEP typically considers in-lake levels higher than 16 mg/m^3 to be indicative of impaired conditions.

Total Suspended Solids

Total suspended solids is a measure of sediments and other particulates and colloidal materials in the water column. While it is related to and often correlated with turbidity, TSS is derived by weighing the suspended solids whereas turbidity is quantified by measuring the scatter of light transmitted through a water sample.

At Freeman Lake, TSS was often below the detection limit (**Table 4**). When it was detectable, TSS was less than 5 mg/L.

Alkalinity

Alkalinity is the capacity of water to resist changes in pH (also known as acid neutralizing capacity) and is driven largely by the bedrock and soil that water comes into contact with prior to entering a pond. However, anthropogenic sources (e.g., soil liming) may also influence the alkalinity of surface waters. Waters with higher alkalinity have a higher buffering capacity and are less susceptible to fluctuations in pH from acid deposition or pollutants.

Alkalinity concentrations in Freeman Lake ranged from 24 mg/L to a maximum of 65 mg/L (**Table 4**). These levels of alkalinity represent a moderate buffering capacity and are typical of water bodies in the Merrimack River Valley.

Bacteria

Fecal coliform bacteria, including *E. coli*, and enterococci, occur in the digestive tracts of humans and other animals. Although these bacteria may not always directly cause illness, they serve as indicators of fecal contamination and possible pathogens.

Freeman Lake hosts a public swimming beach, which is governed by the state *E. coli* standards. Although Station 1 is not at the beach, it is located in the same water body, and therefore may provide useful data regarding the distribution of bacteria in the lake, especially when combined with data collected at locations discharging to the lake. Additionally, fecal coliform results can be useful for comparing to the results obtained by Worden (1995) as well as to current ambient water quality standards for waters without a public swimming beach.

Samples collected as part of this study indicate that *E. coli* and fecal coliform levels conformed to state standards. Peak counts for both indicators occurred in October at 25 col/100 mL (**Table 4**). All *E. coli* and fecal coliform samples were well under the geometric mean standard of 126 cfu/100 mL and 200 cfu/100 mL, respectively; therefore the geometric mean of sample results is necessarily within the standard as well.

2.4.1.2.2 Stony Brook Diversion Channel

Temperature

Instream temperatures ranged from a low of 13.7°C (56.6°F) in April to a high of 24.1°C (75.3°F) in June (**Table 5**). No extreme values were observed.

Dissolved Oxygen

Dissolved oxygen values at Station 2 ranged from a low of 3.5 mg/L during the June sampling event to a high of 9.91 mg/L during the April sampling event (**Table 5**). Dissolved oxygen was lowest from June to October 2024, both as a concentration and when expressed as percent saturation. Conditions were hypoxic in measurements collected during this period, as well, which is unlikely to be considered supportive of warmwater fisheries.

Specific Conductance

Specific conductance at Station 2 ranged from 339 µS/cm to 454 µS/cm over the course of the study. Similar to in-lake specific conductance measurements, Station 2 demonstrated a primarily upward trend in values from April to October 2024 (**Table 5**).

pH

The pH at Station 2 ranged from 6.86 during the October 2024 sampling event to 7.80 the month prior **(Table 5**). These are somewhat higher than pH levels observed at in-lake Station 1.

Turbidity

Turbidity in Station 2 ranged from 2.26 NTU during the April sampling event to 4.34 NTU during the May sampling event (**Table 5**). Turbidity was similar to or slightly elevated above levels observed at in-lake Station 1 over the same time period.

Table 5. Field-Measured Water Quality Results, Station 2, 2023-2024

Date	Temperature (°C)	DO (mg/L)	DO (%)	Specific Conductance (µS/cm)	pH (SU)	Turbidity (NTU)
10/26/23	15.0	7.92	79.2	343	7.27	4.25
4/16/24	13.7	9.91	96.2	372	7.61	2.26
5/30/24	17.4	7.7	82.2	339	7.77	4.34
6/26/24	24.1	3.5	41.1	427	6.95	3.14
8/08/24	20.9	5.0	54.8	435	7.80	2.91
10/02/24	16.0	3.8	38.3	454	6.86	2.46

Nutrients

Total phosphorus concentrations within Station 2 monitored by TRC ranged from 0.024 mg/L in April to 0.126 mg/L during the May sampling event (**Table 6**) and averaged 0.051 mg/L over the study period, which is substantially higher than the in-lake average from Station 1. SRP was detected in two samples collected from Station 2 but only at low concentrations (no higher than 0.02 mg/L).

Total nitrogen at Station 2 averaged 0.95 mg/L, which is somewhat higher than the in-lake average. In contrast to in-lake patterns, nitrate concentrations increased steadily over the course of the study, while TKN peaked in May and then declined through the remainder of the season (**Table 6**).

Table 6. Laboratory Water Quality Results, Station 2, 2023-2024

Date	SRP (mg/L)	Total P (mg/L)	Nitrate (mg/L)	Ammonia (mg/L)	TKN (mg/L)	Chl a mg/m³)	TSS (mg/L)	Alk. (mg/L)	Fecal Col (col/ 100mL)	E-coli (col/ 100mL)
10/26/23	NS	0.025	0.16	<0.05	0.54	NS	NS	33	72	NS
4/16/24	NS	0.024	0.20	0.08	0.48	NS	NS	26	10	NS
5/30/24	0.02	0.126	0.25	<0.10	1.45	10.2	30	32	7000	NS
6/26/24	<0.01	0.043	0.29	0.20	0.71	<2.0	10	45	330	280
8/08/24	0.01	0.050	0.32	0.08	0.52	<2.0	<5.0	24	210	160
10/02/24	<0.01	0.037	0.37	0.08	0.43	4.32	<2.5	53	100	130

Chlorophyll a

Chlorophyll a was only detected in two of the four samples collected at Station 2, reaching its highest concentration of 10.2 mg/m^3 in May (**Table 6**). The detection of chlorophyll a in the Stony Brook diversion at this level suggests that Freeman Lake receives pulses of algal biomass from upstream sources in the Stony Brook watershed. Although much of the algae in Freeman Lake is likely sourced from within the lake itself, the Stony Brook diversion may provide supplemental inputs of algae, which could counter the flushing effects of the diversion inflows.

Total Suspended Solids

At Station 2, TSS was elevated in May and June before falling below detection limits in August and October (**Table 6**). This suggests that Freeman Lake may receive a substantive sediment load from the Stony Brook diversion when flows are sufficient. While unlikely to result in visible plumes of sediment reaching the Freeman Lake outlet, the suspended sediment load from the Stony Brook diversion likely does contribute to siltation near its inlet to Freeman Lake.

Alkalinity

Alkalinity concentrations at Station 2 were similar to those observed at in-lake Station 1, ranging from 24 mg/L to a maximum of 53 mg/L (**Table 6**).

Bacteria

Samples collected as part of this study indicate that the Stony Brook diversion is likely a source of bacteria to Freeman Lake. *E. coli* and fecal coliform levels were generally higher at Station 2 than in-lake Station 1 (**Table 4** and **Table 6**). conformed to state standards. Peak counts for both indicators occurred in October at 25 col/100 mL. Although the Stony Brook diversion is not a swimming beach or adjacent to one, all *E. coli* samples were above the geometric mean standard of 126 cfu/100 mL; therefore the geometric mean of sample results would not meet the state standard for swimming beaches. Fecal coliform results at Station 2 are mostly comparable to those obtained by Worden (1995), except for the very high 7,000 col/100 mL result obtained in May. However, it should be noted that the May sampling event coincided with a runoff-producing storm event.

2.4.1.2.3 Stormwater Outfalls

On May 30, 2024 TRC conducted a storm drain wet weather sampling event. The selected storm event produce approximately 0.28 inches of precipitation in a short period of time.

The most notable results from the wet weather outfall sampling event were the high concentrations of total phosphorus in the discharge from Outfall 1 and Outfall 2 (**Table 7**). These results were an order of magnitude higher than in-lake results and nominally higher than the highest concentrations reported from Station 2.

Also notable were the nitrogen results from Outfall 1, which were elevated for both TKN and nitrate nitrogen. Ammonia nitrogen, a subset of TKN, was also among the highest observed as part of this study (**Table 7**).

Alkalinity results fell well within the expected range (**Table 7**) and were consistent with those observed at Station 1 and Station 2.

Table 7. Water Quality Results from Wet Weather Outfall Sampling, May 30, 2024

Site ID	Location	Total P (mg/L)	Nitrate (mg/L)	Ammonia (mg/L)	TKN (mg/L)	Alk. (mg/L)
Outfall 1 - North	Route 40	0.178	0.6	1.62	3.62	44
Outfall 2 - East	Varney Park/Freeman Lake Beach	0.232	0.16	0.26	1.98	<20.0
Outfall 3 - Northwest	Willis Drive	0.024	0.11	0.21	0.62	31

2.4.2 Discharge

2.4.2.1 Approach

Stream discharge was measured during each field visit to both Station 2 and the outlet stream below the Freeman Lake Dam (Station 1 for discharge measurement purposes only – see **Figure 3**). When sufficient water depth was present, TRC used a Swoffer 2100 current meter mounted on a depth-calibrated wading rod to measure velocity. The time-of-travel method, which measures the amount of time it takes a buoyant object to travel a known distance, was used to estimate velocity when water levels were too low to use the current meter.

Additionally, continuous water level dataloggers (Solinst Levelogger 5) were installed within the stream channel at the Station 1 and Station 2 discharge monitoring locations on November 30, 2023. Additionally, a Solinst barometric pressure logger was installed on a nearby tree to allow for the most accurate correction of the continuous water level data. All three of these dataloggers were set to take a reading every hour over the course of the study. Although they were downloaded occasionally to prevent the potential for data loss, the dataloggers were not removed from the site until the final sampling event on October 2, 2024.

By plotting field-measured discharge against datalogger-recorded water level (stage), a rating curve was developed for each location. Each rating curve consists of a unique power function relating stage and discharge. The rating curves developed for each location were then used to transform the continuous stage data into discharge data (hydrographs) for the full duration of the study.

2.4.2.2 Results

Based on the stage-discharge relationship observed at each location, the following rating curve equations were developed:

Station 1: $Q=11.333H^{0.8779}$

Station 2: $Q=4.244H^{3.9173}$

where Q is discharge in cubic feet per second (cfs) and H is stage in feet

The two hydrographs derived from the application of these equations to the continuous water level data were very similar from November 2023 to May 2024, both in terms of the timing, duration, and magnitude of flows resulting from storm events and the recession of flows back toward a baseflow level of approximately 10 cfs (**Figure 7** and **Figure 8**). However, while flows at Station 2 gradually receded from June to early October 2024, interrupted only by two large storm events in August, flows at Station 1 quickly dropped from more than 10 cfs to 0 cfs in a matter of days. Station 1 discharge remained at or just above 0 cfs for the remainder of the study, with only very short-duration fluctuations into the low single digits cfs. Field visits during this time confirmed that Freeman Lake was not spilling over the dam spillway, which explains the rapid decrease in discharge at the beginning of June. This also suggests that the fluctuating flows at Station 1 were most likely the reflection of two minor inputs. The first source would include direct runoff into the stream channel during storm events large or intense enough to generate runoff. The other source would include groundwater contributions to the outlet stream, which would likely fluctuate with the daily cycles in evapotranspiration associated with vegetation adjacent to the stream. Seepage through the dam structure was another possible source of discharge to the outlet channel, although this was neither obvious during field visits, nor was its assessment within the scope of the study.

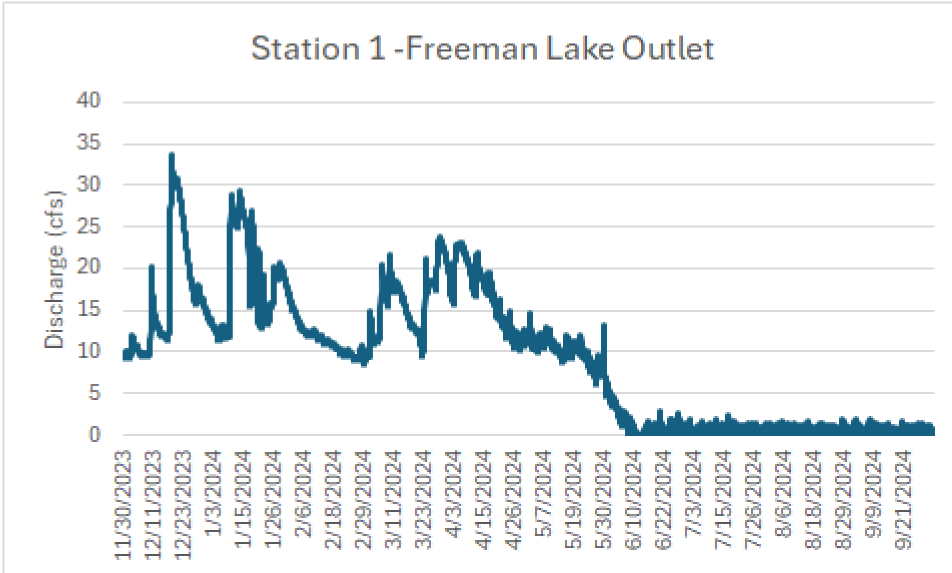

Figure 7. Discharge Series for the Freeman Lake Outlet, November 2023 to October 2024

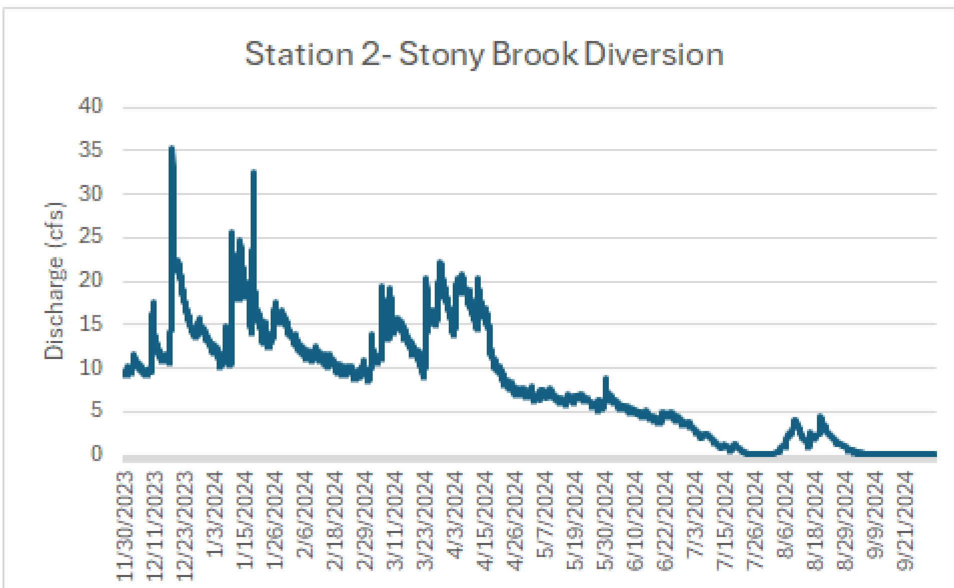

Figure 8. Discharge Series for the Stony Brook Diversion Channel, November 2023 to October 2024

The observed patterns in discharge at Station 1 and Station 2 support the assertion by Worden (1995) that the Stony Brook diversion results in rapid flushing of Freeman Lake, at least as long as water is freely exiting the lake at the dam spillway. However, the current study suggests that during periods of drought, particularly in the growing season, the lake may go months without flushing at all, even though it is still receiving loading of nutrients and bacteria from the Stony Brook diversion.

2.4.3 Sediment Sampling

2.4.3.1 Approach

TRC collected three surficial sediment grabs from Freeman Lake for laboratory analysis on April 30, 2024. Sediment samples were collected using a 6-inch x 6-inch x 6-inch Ekman grab sampler. Samples were analyzed for percent moisture, total phosphorus, and two phosphorus fractions: iron-bound and loosely-sorbed phosphorus. Together, iron-bound and loosely-sorbed phosphorus form what is termed mobile phosphorus because these fractions are the most easily released into the water column under favorable and commonly encountered environmental conditions. Most other phosphorus fractions (e.g., aluminum-bound, calcium-bound, organic) remain chemically bound or adsorbed under typical environmental conditions, although a portion of organic phosphorus may be released over time as organic sediments decay. Laboratory results can be found in **Appendix A**.

2.4.3.2 Results

The highest total phosphorus concentration was observed in the Freeman North sample (**Table 8**), which was collected from the north end of the lake in approximately 3.4 m (11 ft) of water (**Figure 3**). Phosphorus concentrations at this location were more than twice what was observed at the other two locations. It is possible that the higher concentrations of phosphorus documented in the Freeman North sample are related to deposition of phosphorus rich sediments from stormwater outfalls along Route 40. Other potential sources include deposition of aquatic plant matter (aquatic vegetation is very dense in this cove) or accumulation of dead algal cells and other detritus in this cove due to circulation patterns in the lake.

However, a large portion of the phosphorus in Freeman North sediments appears to be inert. The mobile phosphorus fraction was actually highest in the Freeman West sample, which was collected from the west end of the lake in approximately 2.4 m (8 ft) of water (**Figure 3**). Percent moisture was also highest at this location, indicating that sediments are The mobile phosphorus concentration was more than twice that observed in the Freeman North sample and about four times that observed at Freeman South (co-located with water quality Station 1). This suggests that rates of sediment phosphorus release have the potential to be higher from the west end of Freeman Lake relative to the deep hole or northern cove.

Table 8. Sediment Sample Results from Freeman Lake

Location	Percent Moisture	Total Phosphorus (mg/Kg dry)	Mobile Phosphorus (mg/Kg dry)		
			Iron Bound	Loosely-sorbed	Total
Station 1 (Freeman South)	48	333	1.590	4.124	5.714
Freeman West	94	323	13.546	33.881	47.427
Freeman North	88	887	2.933	20.634	23.567

2.4.4 Plankton

2.4.4.1 Approach

During the 2024 study period from April to October, TRC collected water samples at Station 1 of Freeman Lake for analysis of phytoplankton and zooplankton. A 64-µm mesh plankton net was used to collect zooplankton samples. This device was lowered through the water column then drawn vertically upward to capture and concentrate planktonic organisms. Zooplankton samples were preserved in 70% ethanol and analyzed by TRC. Phytoplankton samples were obtained as a surface water grab. The water sample was transferred to an opaque sample jar containing Lugol's iodine solution as a preservative. Phytoplankton samples were analyzed by Aquatic Analysts of Friday Harbor, Washington. The laboratory reports for phytoplankton are included in **Appendix A**.

2.4.4.2 Results

Zooplankton

The zooplankton community in Freeman Lake consisted of taxa that have a widespread distribution and are found in many kinds of waterbodies. The observed zooplankton community included a mix of large- and small-bodied taxa, including copepods, cladocerans, rotifers, and ostracods (**Table 9**).

Zooplankton taxa richness and community composition was similar amongst samples collected from April to August 2024 (**Table 9**). The samples from October 2023 and 2024 both contained taxa that were not observed in other months (primarily different rotifers); however, they were not substantially different.

The May zooplankton sample had higher abundances compared to other months in the 2024 monitoring period (**Table 9**). The most abundant zooplankton group observed were copepods, specifically in the calanoida taxon, which was present during each sampling event.

No nuisance zooplankters (e.g., dreissenid [zebra or quagga] mussel veligers, spiny water flea [*Bythotrephes longimanus*]) were observed in the samples taken for this study.

Table 9. Freeman Lake Zooplankton Relative Abundance, 2023-2024

Group	Taxon	Qualitative Abundance[1]					
		10/26/2023	4/16/2024	5/30/2024	6/26/2024	8/8/2024	10/2/2024
Copepoda	Calanoida	C	A	C	C	C	A
	Diacyclops thomasi		R	O	R	R	
	Cyclopoid nauplius	R		O	C	A	C
	Cyclopoida		O		R	R	
Cladocera	*Bosmina longirostris*		O	R			
	Daphnia sp.	C	O	A	A	R	C

Group	Taxon	Qualitative Abundance[1]					
		10/26/2023	4/16/2024	5/30/2024	6/26/2024	8/8/2024	10/2/2024
Rotifera	*Asplanchna brightwelli*	R					R
	Trichocerca sp.	A					
	Kellicottia longispina		R	R	O	R	O
Crustacea	Ostracoda		A	C	R	O	

[1]A = Abundant, C = Common, O = Occasional, R = Rare

Phytoplankton

A moderately diverse phytoplankton assemblage was observed in Freeman Lake, with over 60 taxa observed. The greatest taxa richness was observed in the diatom algae with 32 taxa recorded, although this was observed to vary considerably by month. The most regularly observed phytoplankter within the lake was *Cryptomonas erosa* (Cryptophyte). Similar to other flagellates, *Cryptomonas* is known to make diel vertical migrations in the water column, presumably to optimize light intensity and nutrient availability (Clay 2015).

Although cyanobacteria were present in all samples except April 2024, cell counts were below MDPH recreational health advisory levels (70,000 cells/mL, **Table 10**).

Table 10. Freeman Lake Phytoplankton Total Densities,2023 –2024

Date	Other Algae (% density)	Cyanobacteria (% density)	Cyanobacteria Cell Count (cells/mL)	Cyanobacteria Taxa Present
10/26/23	46.5	53.5	12,642	*Aphanizomenon flos-aquae* *Dolichospermum flos-aquae* *D. planctonica* *Microcystis aeruginosa*
4/16/24	100.0	0	0	None
5/30/24	97.4	2.6	583	*Dolichospermum flos-aquae*
6/26/24	75.5	24.5	1,550	*Aphanizomenon flos-aquae* *Dolichospermum flos-aquae* *D. planctonica*
8/8/24	80.0	20.0	5,738	*Aphanizomenon flos-aquae* *Dolichospermum flos-aquae* *D. planctonica*
10/2/24	69.9	30.1	7,329	*Dolichospermum flos-aquae* *D. planctonica*

2.5 Aquatic Vegetation

2.5.1 Approach

TRC conducted an initial qualitative aquatic vegetation assessment of Freeman Lake on October 30, 2023 to become familiar with the lake and invasive species present. Given the late time of the year for the initial survey, the quantitative survey was conducted well into the growing season (June 26) during the following year. The quantitative survey included mapping the locations of all aquatic plant species observed in areas likely to support aquatic plant growth (i.e., water depths less than 20 feet, dominance of sand or finer-grained substrates, and protected coves). Observations of species composition, plant cover, and biovolume were collected, with special attention paid to documenting the presence of invasive exotic plant species. Although the focus was on aquatic invasive species, all vascular aquatic plants were identified to genus or species level in the field by qualified staff.

Direct visual observations were used to identify and quantify plant growth in the shallowest waters and for floating or floating-leaved plants. A double-sided throw rake was used to collect samples of submerged species in deeper waters. Percent cover and biovolume were visually ranked at each location using the following scale; 0%, 1-25%, 26-50%, 51-75% and greater than 75%. Percent cover is a measure of areal coverage (i.e., a two-dimensional measure) while biovolume is based on portion of the water column taken up by plants. All observed species, percent cover, and biovolume were recorded at each point and positions were collected with a sub-meter accurate tablet GPS system.

2.5.2 Results

The total aquatic plant coverage in Freeman Lake was found to be approximately 19.2 acres out of 81.8 total acres (**Figure 9**). The majority of areas with plant growth consisted of very dense beds (i.e., cover more than 75% of the lake bottom). Although aquatic plants were found around most of the periphery of the lake, the largest contiguous beds were generally found in the western half.

Water chestnut patch observed in Freeman Lake

Aquatic plant biovolume mapping indicated that a majority of beds were characterized by biovolumes in excess of 50% of the water column (**Figure 10**). These areas tend to be difficult to navigate and, when consisting of an extensive monoculture, tend to provide reduced habitat value for aquatic life.

Mixed bed of native white water lily at the surface with non-native Eurasian milfoil and fanwort growing below.

In total, 15 species of aquatic plants were observed in Freeman Lake (**Table 11**). Of these species, three were observed to be non-native invasive species, including one species – water chestnut (*Trapa natans*) – that was not previously reported by Worden (1995) or SOLitude (2018). Eurasian milfoil (*Myriophyllum spicatum*) was observed to be most prevalent at the time of the survey and was co-located with many of the densest, highest biovolume plant beds (**Figure 11**). However, fanwort (*Cabomba caroliniana*) and water chestnut were also present at nuisance levels, extending across 6.3 and 4.1 acres, respectively (**Figure 12** and **Figure 13**).

Amongst the native species, white water lily (*Nymphaea odorata*) was the most commonly observed, particularly along the shallow margins and protected coves of the lake. Other species that were locally common in the shallowest shoreline areas include pickerelweed (*Pontederia cordata*) and bur-reed (*Sparganium americanum*), both of which were present in submerged and emergent forms. In deeper areas, submerged but unrooted plants like coontail (*Ceratophyllum demersum*) and common bladderwort (*Utricularia vulgaris*) mixed with larger rooted pondweeds (*Potamogeton* spp.) and water celery (*Vallisneria americana*).

Table 11. Aquatic Plant Species Observed in Freeman Lake, June 26, 2024

Common Name	Scientific Name	Native or Exotic
American bur-reed	*Sparganium americanum*	Native
Bigleaf Pondweed	*Potamogeton amplifolius*	Native
Canadian Waterweed	*Elodea canadensis*	Native
Common Bladderwort	*Utricularia vulgaris*	Native
Coontail	*Ceratophyllum demersum*	Native
Eurasian Milfoil	*Myriophyllum spicatum*	Exotic
Fanwort	*Cabomba caroliniana*	Exotic
Floating-Leaf Pondweed	*Potamogeton epihydrus*	Native
Pickerelweed	*Pontederia cordata*	Native
Spiral Pondweed	*Potamogeton spirillus*	Native
Water Celery	*Vallisneria americana*	Native
Water Chestnut	*Trapa natans*	Exotic
Watershield	*Brasenia schreberi*	Native
White Water Lily	*Nymphaea odorata*	Native
Yellow Water Lily	*Nuphar variegata*	Native

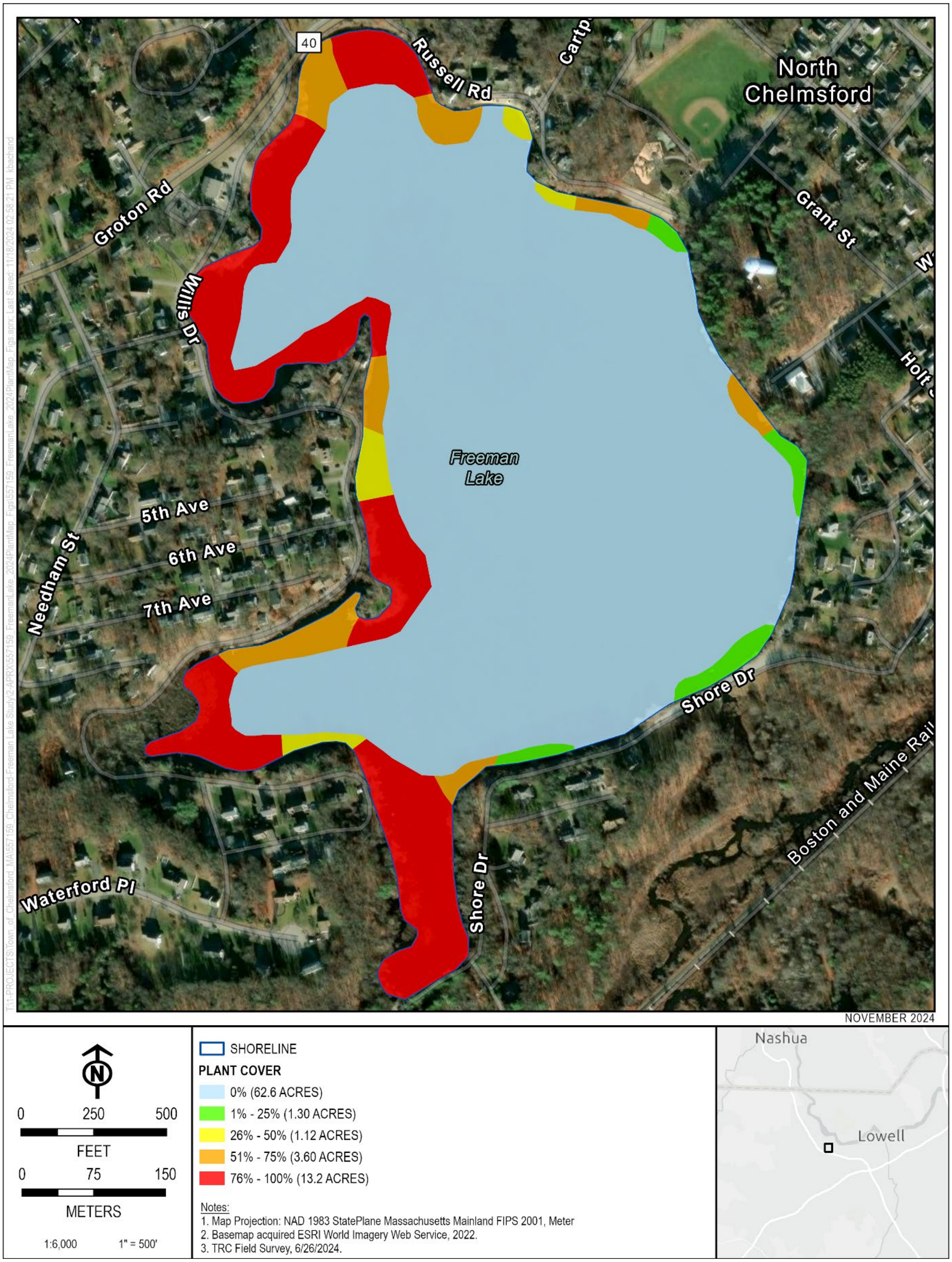

Figure 9. Aquatic Plant Cover in Freeman Lake, June 26, 2024

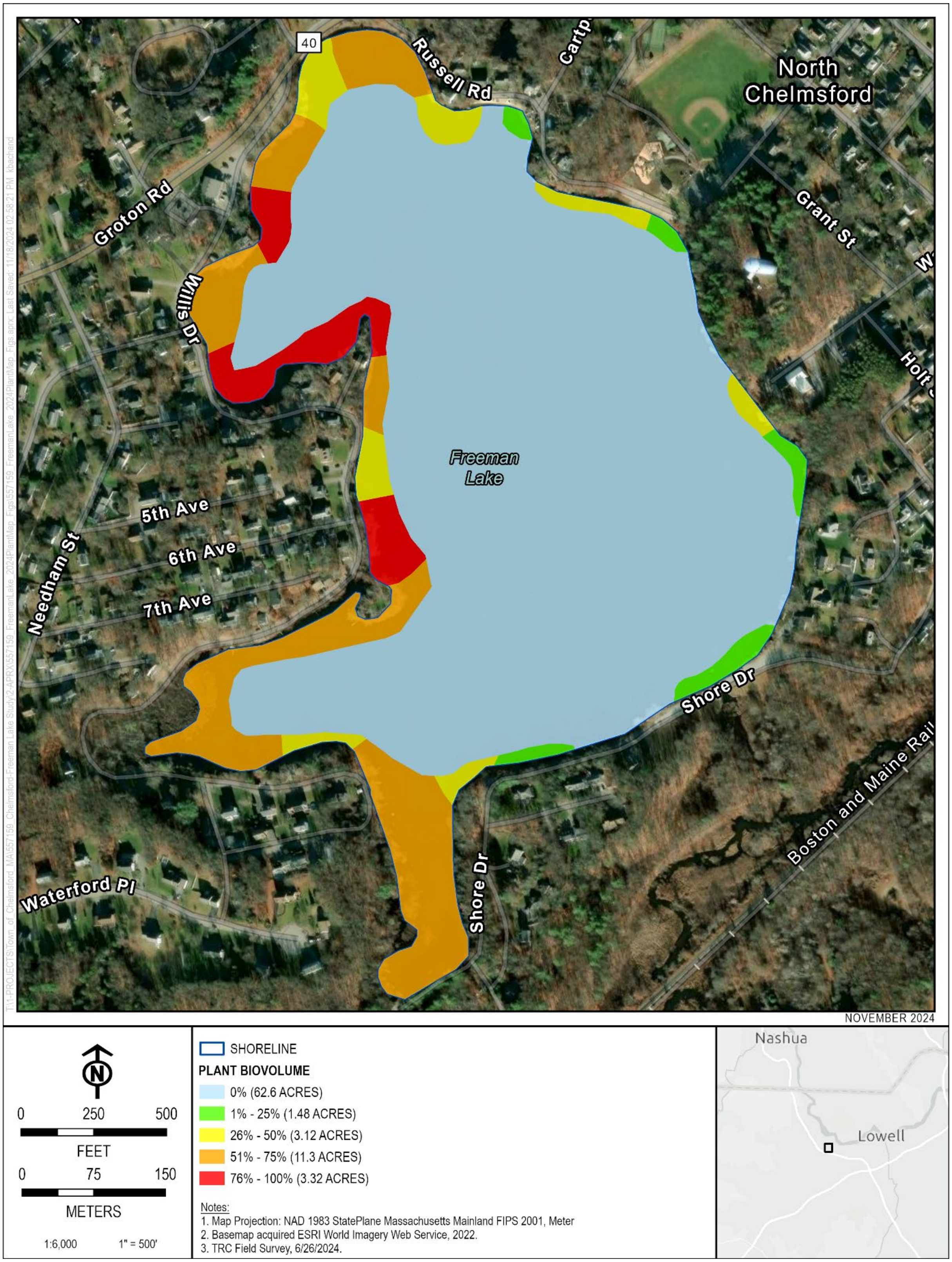

Figure 10. Aquatic Plant Biovolume in Freeman Lake, June 26, 2024

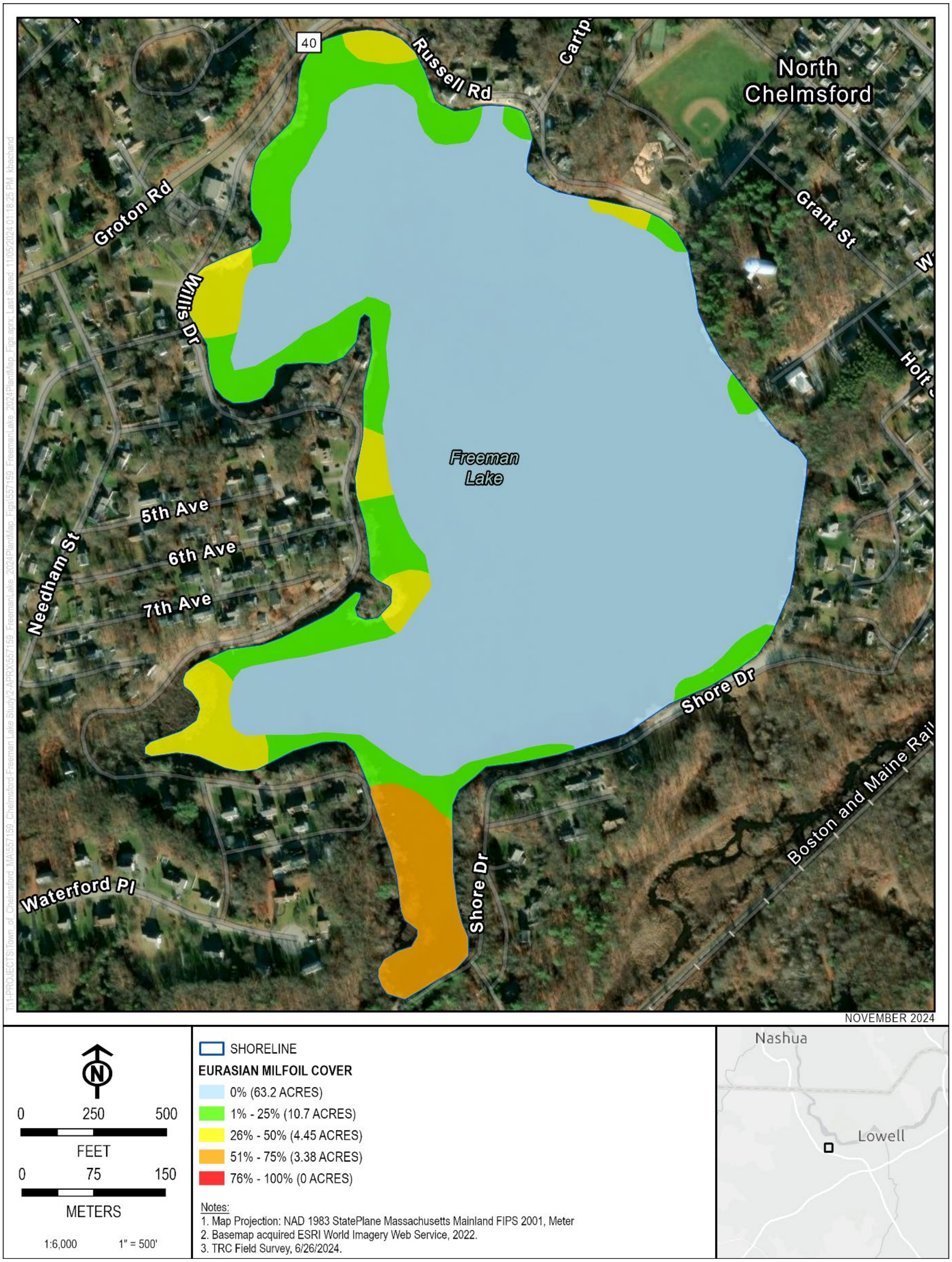

Figure 11. Eurasian Milfoil in Freeman Lake, June 26, 2024

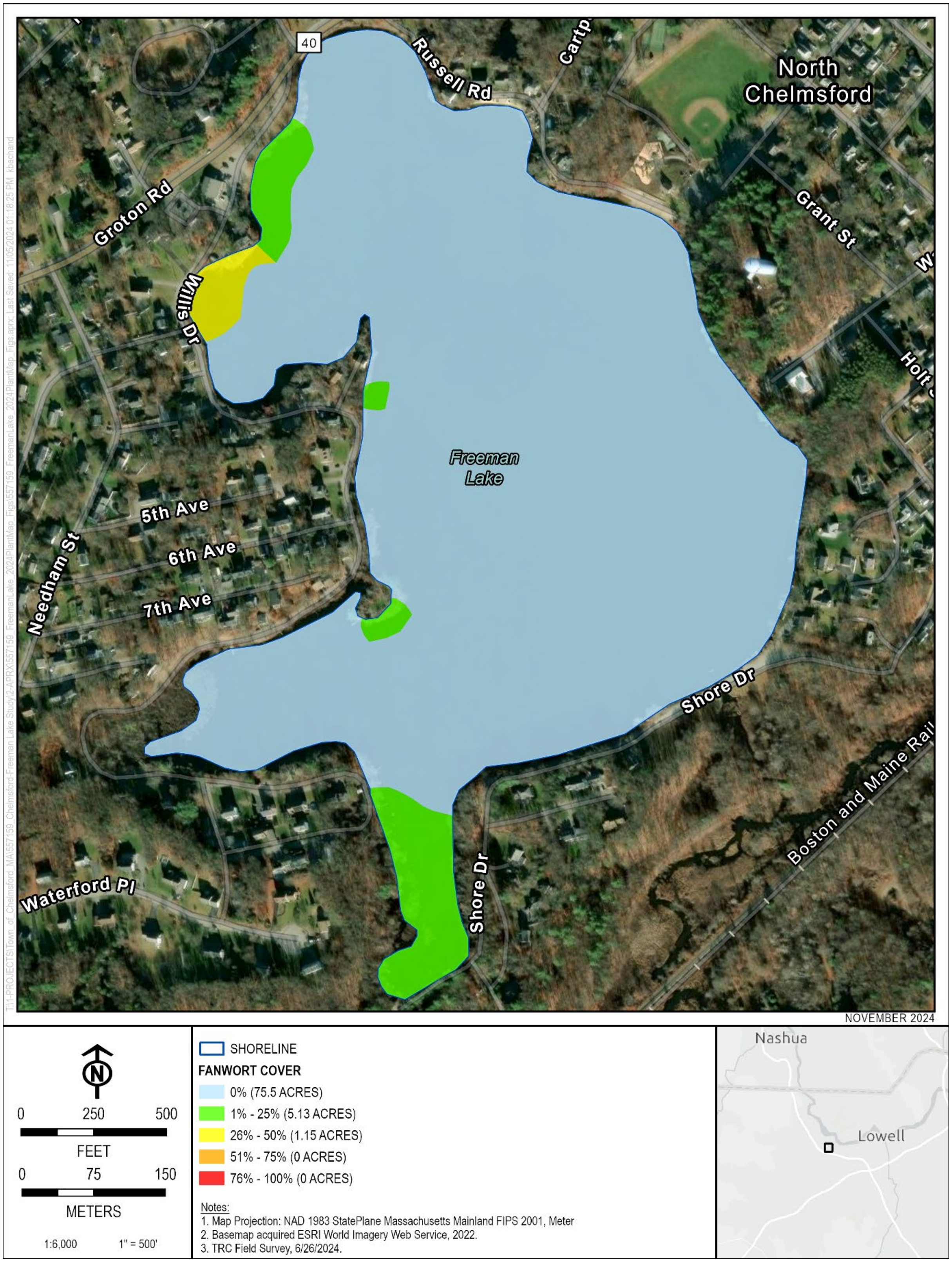

Figure 12. Fanwort in Freeman Lake, June 26, 2024

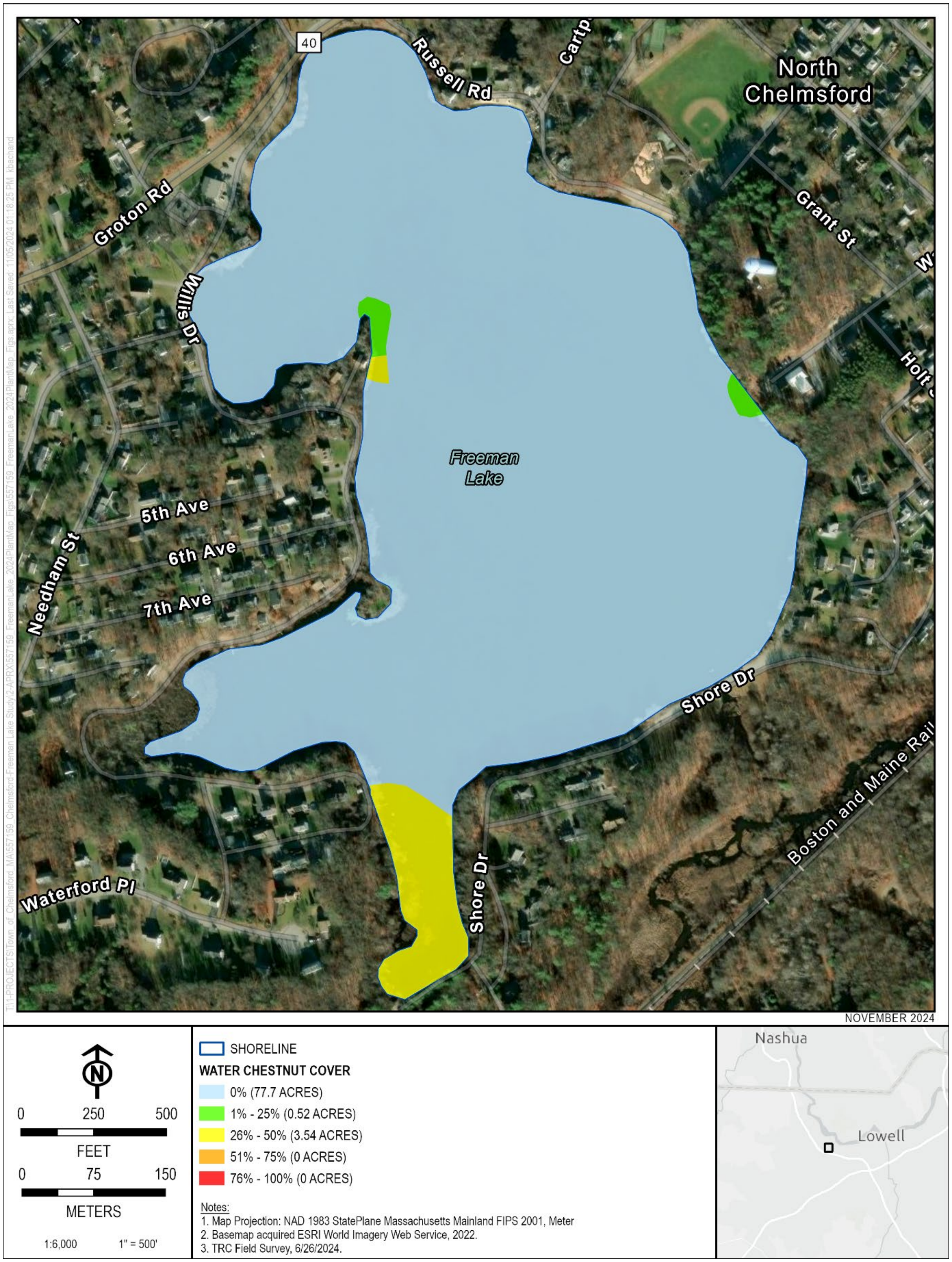

Figure 13. Water Chestnut in Freeman Lake, June 26, 2024

2.6 Nutrient Budget

Determining the hydrologic budget is the first step toward understanding nutrient loading, because all water being delivered to the lake carries nutrients. A hydrologic budget identifies water inflow into the lake, storage capacity within the lake, and water outflow from the lake based on the hydrologic cycle. Sources of water inflow include precipitation onto the lake surface, as well as associated overland runoff, direct stream flow from tributaries, and groundwater seepage occurring principally along the margins of the lake. Evapotranspiration (evaporation plus plant uptake), groundwater recharge from the lake back to the surrounding soils, and direct outflow via the lake's spillway (at high water) all lead to loss of water. The difference between the sum of the inflows and sum of the outflows determines the volume of water stored in the lake at a given point in time. For the purposes of this study, the hydrologic budget was estimated on an annualized basis.

The hydrologic data suggests that the Stony Brook diversion contributes the largest volume of water to Freeman Lake of all sources over the course of a year (approximately 82% - see **Table 12**). Annual direct precipitation was the smallest source.

Compared to Worden (1995), some estimates were remarkably similar (e.g., groundwater) while others were much different (**Table 12**). The most substantive differences were observed in the estimates for the Stony Brook diversion and the local sub-watershed. The former is likely due to the fact that this study derived an annualized discharge estimate based on continuous data while Worden assumed that a single discharge reading in April was representative of the average flow rate. Given the fact that the October 2023 to September 2024 water year aligns almost perfectly with the current study's duration and that precipitation during this time was very close to the annual average (approximately 103% of average, NOAA 2024), the data collected are expected to be very representative of an average year. The difference in the hydrologic estimate for the local sub-watershed is likely based in the fact that Worden assumed the only discharge was from the area draining Route 40, whereas the current study included surface runoff and stormwater discharge from the entire local sub-watershed.

Table 12. Comparison of Freeman Lake Annual Hydrologic Budget, 1995 and Present

Element	Units	Worden (1995)	This Study	Difference	Notes
Stony Brook Sub-Watershed Area	ha	13,209	11,090	2,119	Worden used estimate from Stony Brook Watershed Association. his study delineated watershed area with USGS StreamStats.
Local Sub-Watershed Area	ha	248	238	10	Worden estimated local watershed area delineated from USGS topographic maps. This study delineated watershed area with USGS StreamStats.
Lake Area	ha	31	33	-2	Worden used estimated lake area. This study delineated lake area using GIS.

Element	Units	Worden (1995)	This Study	Difference	Notes
Lake Volume	m^3	1,066,609	1,200,690	-134,081	Worden used bathymetry based on fewer soundings and estimated geographic positions. This study used 2024 bathymetry data from DFW.
Average Water Depth	m	3.4	3.6	-0.2	
Annual Groundwater Contribution	m^3/yr	571,246	568,550	2,696	
Annual Direct Precipitation Less Evapotranspiration	m^3/yr	131,184	207,936	-76,752	Worden value based on smaller estimated surface area of lake and lower annual precipitation. Also, Worden used Thornthwaite formula for evapotranspiration, while current study used average of Boston, MA and Concord, NH stations (NRCC 2024).
Annual Surface Water – Stony Brook	m^3/yr	15,093,696	6,197,862	8,895,834	Worden value was based on representative discrete field measurement. TRC value is based on continuous measurement over nearly 12 months.
Annual Surface Water - Local	m^3/yr	10,918	599,554	-588,636	Worden value based only on Route 40 catch basin system runoff (i.e., ignored runoff from rest of local sub-watershed).
Annual Total	m^3/yr	15,807,044	7,573,902	8,233,142	
Flushing Rate	flushes/yr	15	6	9	
Detention Time	days	24	58	-34	

The hydrologic budget described above was then used along with water quality obtained during this study to estimate the annual nutrient load to Freeman Lake. A nutrient budget describes the quantities of nutrients entering, circulating within, and exiting the lake system. The amount of each nutrient is expressed as a nutrient load, which is the total mass of the nutrient entering the lake over a given time period. Phosphorus budget model outputs for Freeman Lake are provided in **Table 13**. The inputs to the nutrient model include parameters from the hydrologic budget and the results of water quality sampling. Inputs that were not directly observed or measured (e.g., precipitation) were derived from published literature values or government agency data.

Hydrologic parameters were used to model characteristics that influence how nutrients move through the lake system itself. These characteristics include the mean depth (lake volume/lake area), flushing rate (number of times per year that the total volume of water in the lake is renewed), areal water load (volume of water entering the lake in a year divided by the lake surface area), and settling velocity (rate at which a particle drops from the water column).

Water quality data collected during this study were used to derive the concentration of phosphorus flowing into and out of the lake for development of a nutrient budget. Regional estimates for phosphorus deposition were used to estimate precipitation inputs. Septic inputs were assumed to be negligible, given the current extent of sanitary sewers around the lake and review of Town records; therefore, groundwater loading rates were trimmed to reflect a likely improvement since 1995. Sediment sample data were used to estimate phosphorus release rates and the contribution from internal loading. Contributions from resident waterfowl were also included.

Once the nutrient loads for the existing conditions were calculated, these were used to determine the permissible and critical phosphorus load for Freeman Lake, based on Vollenweider (1968). Permissible load is the phosphorus load below which no algal productivity problems are expected. Critical load is the phosphorus load above which algal productivity problems are almost certain to persist. Between the permissible and critical levels, algal productivity is very sensitive to any change in phosphorus loading. This means that additional loading results in deterioration of water quality and reduced loading results in improvement. Once above the critical load, a water body is considered to be practically saturated with phosphorus, meaning very little change in algal productivity should be expected with increased or decreased loads.

The results of this analysis indicate that the existing conditions for phosphorus in Freeman Lake are well above Vollenweider's permissible load (**Table 13**). However, they are still below Vollenweider's critical load. This indicates that the phosphorus levels in Freeman Lake are currently elevated and that further increases may lead to a state of persistent and recurring algal blooms. However, it also suggests that reductions in phosphorus will be effective in improving water clarity and reducing the amount of time Freeman Lake is impacted by algae blooms.

Similar loading limits for nitrogen have not been established, owing to the less predictable relationship between nitrogen, lake hydrology, and primary productivity. Although nitrogen data are very useful in understanding in-lake conditions and processes, phosphorus is likely to be the better candidate as the primary target of water quality management actions. The reasons for this are varied but include the following:

- Phosphorus is more practical to manage both in the watershed and in-lake with current technologies.
- Some cyanobacteria can fix their own nitrogen from the atmosphere when bioavailable nitrogen is in short supply. This means that some of the most problematic phytoplankton can still persist, at least for a while, under nitrogen-limited conditions.
- The amount of phosphorus that needs to be removed from the system to see improvements is often an order or two of magnitude less than nitrogen.

Table 13. Comparison of Freeman Lake Annual Phosphorus Loading, 1995 and Present

Element	Units	Worden (1995)	This Study	Difference	Notes
Annual Groundwater Contribution	kg/yr	28.6	14.2	14.4	Additional sewering since 1995
Annual Deposition	kg/yr	10.9	11.6	-0.7	Worden used estimated lake area. This study delineated lake area using GIS.
Annual Surface Water – Stony Brook	kg/yr	301.9	232.2	69.7	
Annual Surface Water - Local	kg/yr	3.6	22.7	-19.1	Worden value based only on Route 40 catch basin system runoff.
Annual Internal Loading	kg/yr	NA	19.0	NA	Worden did not include
Other Sources – e.g., Resident Waterfowl	kg/yr	NA	1.4	NA	Worden did not include
Annual Total	kg/yr	344.9	301.0	43.9	
Permissible Load	kg/yr	NA	160.5	NA	
Critical Load	kg/yr	NA	321.1	NA	

2.7 Trophic State

The trophic state of a lake is a measure of its productivity. Nutrient-poor waterbodies are classified as oligotrophic and tend to support little primary production (plants or algae). The low respiration rates in oligotrophic waterbodies generally support adequate levels of dissolved oxygen for aquatic life use throughout most or all of the water column. As nutrient levels increase, a waterbody may move into higher (more productive) trophic states, sequentially mesotrophic, eutrophic, and hypereutrophic. These states are accompanied by increasing rooted plant and/or algae growth and sedimentation rates. Eutrophication can be greatly accelerated through human-induced sediment and nutrient loading from the watershed (cultural eutrophication).

Carlson (1977) developed a Trophic State Index (TSI) to standardize and facilitate communication with the public regarding the trophic status of lakes and ponds. The TSI scale was first derived for Secchi disk transparency but additional parameters, such as total phosphorus and chlorophyll a were also incorporated. In practice, the TSI scale extends from 0 (nutrient-poor) to 100 (extremely fertile) and corresponds to the traditional trophic state categories, as follows: oligotrophic lakes less than 40, mesotrophic lakes between 40 and 50, eutrophic lakes between 50 and 70, and hypereutrophic lakes above 70.

The measured values for Secchi disk transparency, chlorophyll a, and total phosphorus at Freeman Lake were transformed into TSI scores to facilitate discussion of its trophic state. It should be noted that single measurements or even multiple measurements from a single season are unlikely to sufficiently account for the expected natural variation of the TSI. Nor can limited data be used to infer trends in the trophic state of a water body. That said, the TSI does provide a useful tool for describing the likely current trophic state, especially when interpreted in the context of additional data pertaining to the aquatic vegetation and algal communities.

Based on Secchi disk transparency from this study, the TSI for Freeman Lake was 50.8, which is suggestive of a borderline eutrophic state. This is higher than the Secchi disk-based TSI derived from Worden (1995) (**Table 14**), which was more reflective of a mesotrophic condition. However, it is important to note that Secchi disk transparency is affected not only by phytoplankton productivity but also by other sources of turbidity (e.g., suspended sediments).

Based on chlorophyll a levels from this study, the TSI for Freeman Lake was 54.1, which is suggestive of a eutrophic state (**Table 14**). Worden (1995) did not analyze chlorophyll a. Therefore, this measure cannot be directly compared.

When the TSI is calculated for phosphorus, Freeman Lake currently averages 53.2, which supports a eutrophic classification. Interestingly, this TSI is lower than the phosphorus-based TSI derived from Worden (**Table 14**). However, both studies found phosphorus concentrations that were reflective of a eutrophic condition.

Table 14. Comparison of Freeman Lake Trophic State, 1995 and Present

Data Source	Secchi TSI	Chlorophyll a TSI	Phosphorus TSI	Trophic State
Worden (1995)*	44.4	NA	60.0	Mesotrophic to Eutrophic
This Study	50.8	54.1	53.2	Eutrophic

*Includes other recent data cited by Worden

In the context of the overall TSI analysis and supporting information, a eutrophic classification would appear to be appropriate for Freeman Lake. It is difficult to say whether the trophic state has changed substantively since 1995 because the change in TSI was not unidirectional. However, the following observations imply that changes in lake conditions have occurred:

- In-lake nutrient levels, including both total phosphorus and total nitrogen levels were lower in the current study than in 1995.
- The highest (best) Secchi disk transparency reading from the current study is lower than the average reading in 1995. Therefore, water clarity has declined, which would typically be tied to increased algal productivity. However, given the reductions in phosphorus and nitrogen observed, the water clarity decline may instead be related to increased organic matter in the water column (lake browning) or some other factor.

3.0 Management Assessment

This section presents and assesses the range of options for improving the management of Freeman Lake to meet the following goals:

- Reduce or eliminate nuisance species and prevent the introduction of new aquatic invasive species
- Improve water quality for swimming, secondary recreation, and aquatic life
- Maintain or improve fish and wildlife habitat

Given the number of issues currently impacting the lake, including water quality, nuisance aquatic plant growth, and general eutrophication, a wide range of management options were assessed for the lake and its watershed. TRC included all management options previously recommended by Worden (1995) in this Management Assessment but also considered a few additional options that have since become available and have potential to be applicable to the management of Freeman Lake.

3.1 Management Options

Management options can be broadly broken down into in-lake and watershed management actions. An overview of each is provided in the following two sections.

3.1.1 In Lake Management Options

In-lake actions are those that are implemented within the footprint of the lake to directly address the management issues observed. These actions may be biological, chemical, or physical/mechanical in nature, although some actions may span more than one type.

Biological management actions are those that involve the introduction of live organisms or cultures to a lake. Typically, these actions seek to encourage a beneficial, biologically mediated process or to control nuisance species through predation, herbivory, or parasitism.

Chemical management actions are those that involve the application of a manufactured chemical to lake waters or target organisms. This group of actions typically seeks to encourage a beneficial chemical process or to control target species by mediating their growth or inducing mortality.

Physical and mechanical management actions are those that involve the use of structures, physical media, or mechanical action to address lake management issues. These encompass a wide range of activities, including but not limited to direct removal of target species, manipulation of water levels or depths, placement of barriers, induction of water movement, and the like.

In-lake options considered for Freeman Lake are presented in **Table 15.**

Table 15. In-Lake Management Options Considered for Freeman Lake

Approach	Issue(s) Addressed	Advantages	Drawbacks	Included in Worden (1995)
Aeration or Circulation	Excessive algal growth Low dissolved oxygen	Increases dissolved oxygen if correctly implemented Customizable to site needs	Requires ongoing power source and maintenance to maintain benefits. Improper design or operation may worsen conditions	No
Algaecides	Excessive algal growth	Cost-effective for large areas over short term	Does not address root cause Possible water use restrictions	No
Barley Straw	Excessive algal growth	Cost-effective for small areas	Low predictability of outcome Requires long exposure time to generate desired effect Not effective on active blooms – only works as a preventative to slow algal growth Does not address root cause of excessive algae	No
Benthic Barriers	Excessive aquatic plant growth	Modular approach that is customizable to site Very effective against rooted macrophytes	High cost per area managed Non-selective control method with direct impacts to non-target species Requires maintenance to retain effectiveness	Yes
Bioaugmentation	Sedimentation Poor water quality Excessive aquatic plant growth Excessive algal growth	Variety of enzyme and microbial product options to address different management issues	Low predictability of outcome Quality of commercially available products may vary substantially between brands and batches Many products require frequent testing and reapplication, leading to low cost-effectiveness over time May require simultaneous implementation of aeration, circulation, or oxygenation to work as advertised, which complicates implementation.	No
Biomanipulation	Excessive algal growth	Can be cost-effective	Low predictability of outcome and likely impacts to non-target species	No
Dilution or Flushing	Excessive pollutant concentration and algal growth	Reduces or displaces pollutants and/or algae	Need readily available source of clean water for dilution – however, the cleanest water is often reserved for other purposes (e.g., drinking water)	Yes

Approach	Issue(s) Addressed	Advantages	Drawbacks	Included in Worden (1995)
			Potential to introduce new invasive species	
Drawdown – Permanent	Shoreline erosion	Potential to increase vegetative buffers and reduce shoreline erosion. Possible improvements to water quality due to higher flushing rate and reduced volume of anoxic hypolimnetic water. Low level outlet would provide mechanism to maintain downstream flow when water is below spillway elevation.	Reduced aquatic habitat volume and recreational area. Lateral migration of the shoreline would not be the same for all waterfront property owners. Some would end up much farther from the shoreline while others would realize only minimal change. Permanent impact to shallow wells. If new areas of exposed lakebed are not actively managed, invasive species may end up dominating the terrestrial vegetative buffers, creating a new management problem. Lowered water levels open up more aquatic habitat for existing invasive species.	Yes
Drawdown - Seasonal	Excessive aquatic plant growth	Effective on two of the primary invasive species in the lake (Eurasian milfoil and fanwort). Highly cost-effective once program is established. Improves access for maintenance of existing shoreline structures.	Temporarily reduces aquatic habitat volume and impacts shallow wells. Ineffective on curly-leaf pondweed, brittle naiad, and water chestnut. May inadvertently enhance growth of these species. Relies on extended periods of dry, freezing weather, which are favored to become less frequent with climate change. Only effective on areas fully dewatered and directly exposed to air.	Yes*
Dredging	Sedimentation Excessive aquatic plant growth Internal loading of phosphorus	Quickly restores lake depth and reduces habitat area for aquatic nuisance plants. Removes nutrient-rich sediments as well as the seed bank and/or root crowns of nuisance plant species. Increases storage and/or habitat volume Benefits may last decades	Non-selective method with direct impacts to non-target species. Contaminated sediments, if present, may make project cost-prohibitive.	No

Approach	Issue(s) Addressed	Advantages	Drawbacks	Included in Worden (1995)
Fragment Barriers	Excessive aquatic plant growth	One of the few passive measures for preventing the spread of invasive species Can be used to prevent spread from a contained infestation or to protect an area that has recently been cleared of invasive plants	A portion of fragments will end up getting through the barrier Can be difficult to effectively place, especially if water levels fluctuate Presents a barrier to navigation	No
Harvesting – Hand	Excessive plant growth	Allows for precision removal of target species with negligible impact to other resources Can be very effective on water chestnut, especially when beds are sparse or compact Simplicity of approach – often the best for pioneer infestations	Not practical for control of established infestations. Can spread nuisance plant seeds or fragments if implemented with poor technique or at the wrong time of year	No
Harvesting – DASH	Excessive aquatic plant growth	Allows for precision removal of target species with negligible impact to other resources Improved efficiency and reduced fragmentation compared to hand harvesting of submerged aquatic plants	Not cost-effective for large areas or established infestations. Logistically more difficult than hand harvesting.	No
Harvesting – Mechanical	Excessive aquatic plant growth	Can clear large areas in less time than other types of harvesting Effective for removal of annual species with floating or floating-leaved growth habit such as water chestnut	Only controls biomass of submerged perennial species – does not remove the plants. Can spread nuisance plant seeds or fragments if implemented with poor technique or at the wrong time of year. Logistically more difficult than other harvesting methods. Not feasible in shallowest areas.	Yes
Herbicides	Excessive plant growth	Control can quickly be achieved over large areas Cost-effective in the short-term	Possible water use restrictions – irrigation in most cases Some non-target plant impacts likely except for the most selective herbicides One of the most effective systemic herbicides for control of fanwort and Eurasian milfoil (Sonar) requires long contact time, which may be a challenge to achieve in a frequently flushed water body like Freeman Lake	Yes

Approach	Issue(s) Addressed	Advantages	Drawbacks	Included in Worden (1995)
Herbivores	Excessive plant growth	Species-specific herbivores are a highly selective method	Relatively few plant species are effectively controlled this way Many herbivores cannot be imported/stocked in Massachusetts (e.g., triploid grass carp)	No
Hydroraking	Excessive plant growth Accumulation of coarse organic matter	Effective on bulky plants that are difficult to control through most other methods Can be useful to clear coarse debris and nuisance growth from small areas near key recreational locations (e.g., beaches and boat launches) Carries certain benefits of dredging but with reduced permitting	Slow and not cost-effective for moderate to large areas Difficult to avoid spread of nuisance plant seeds/fragments	No
Nutrient Inactivation	Excessive nutrients and algal growth	Works immediately Addresses internal loading of phosphorus – one cause of excessive algal growth	Does not address external sources of nutrients (when applied directly to the lake) Cost-effectiveness much reduced in lakes with high flushing rates	No
Oxygenation	Excessive algal growth Low dissolved oxygen	Increases dissolved oxygen in a way that is often superior to aeration/ circulation for thermally stratified lakes Customizable to site needs	Requires ongoing power source and maintenance to maintain benefits. Improper design or operation may provide minimal benefit	No
Plant Competition	Exotic plant growth Excessive algal growth	Ecological benefits from increase in habitat complexity and restoration of native plant community	Low predictability of outcome Logistically difficult and costly over large areas Not effective if nuisance species have not already been controlled by other means	No
Sonication	Excessive algal growth	Method is somewhat selective with minimal impact to non-target species	Only controls algae that are present during operation – does not address source Often requires multiple units to cover relatively small areas due to limited effectiveness over long distances and line of sight requirements Requires power source and regular maintenance	No

*Evaluated but not recommended

3.1.2 Watershed Management Options

Watershed management options include chemical, physical, and behavioral activities.

Chemical management actions are those that involve the application of a manufactured chemical to watershed sources. This group of actions typically seeks to encourage a beneficial chemical process to treat water before it enters the lake.

Physical and mechanical management actions are those that involve the use of structures, physical media, or mechanical action to address watershed sources. These encompass a wide range of activities.

Behavioral management actions are those that encourage or require changes in human behavior to address watershed sources.

Watershed management options for Freeman Lake are presented in **Table 16**.

Table 16. Watershed Management Options Considered for Freeman Lake

Approach	Issue(s) Addressed	Advantages	Drawbacks	Included in Worden (1995)
Nutrient Inactivation (Dosing Station)	Excessive nutrients and algal growth	Most cost-effective method of reducing external nutrient loading Can be optimized to strategically target the most impactful nutrient loading events	Addresses proximal cause but not root cause of watershed nutrient loading Requires land, power source, and regular maintenance Operating costs may fluctuate a lot with commodity prices	No
Public Education and Outreach	Various	Allows community to stay informed May lead to more active involvement and behavioral changes that benefit water quality or biological condition	Improvements directly tied to behavioral changes are likely to be marginal. Must be paired with other in-lake and watershed management actions to achieve substantial improvements.	Yes
Resident Waterfowl Control	Excessive nutrients and bacteria	Addresses one source of nutrients and bacteria Passive measures can provide secondary ecological, water quality, or aesthetic benefits	Active measures require persistence to be effective Many passive measures are ineffective. Those that are effective may also impede lake access for people	Yes, Varney Playground
Septic System Improvements or Sewering	Excessive nutrients and bacteria	Addresses one source of nutrients and bacteria	Improved systems may reduce septic loading but will not eliminate it Sewering results in reduced groundwater recharge, which may	Yes, implemented

Approach	Issue(s) Addressed	Advantages	Drawbacks	Included in Worden (1995)
			negatively impact local water budget Overall costs could be high, although costs may vary substantially by residence/lot requirements	
Shoreline Road Maintenance	Excessive nutrients, bacteria, sediment, and other pollutants	Precludes erosion and prevents pollutants from entering lake.	Aside from the cost and effort required, there are few drawbacks of any kind.	Yes
Stormwater Controls	Excessive nutrients, bacteria, sediment, and other pollutants	Addresses root watershed source of a wide range of pollutants Provides opportunity to improve aesthetics and wildlife habitat (especially green infrastructure)	Best when incorporated into designs for new developments or infrastructure. Retrofits tend to be comparatively difficult to implement and have lower cost-effectiveness. Maintenance costs are often high, which may lead to failure	Yes, drainage from Route 40
Watercraft Inspections	Exotic plant growth	Prevents introductions of new exotic species Serves as a secondary means of public education and outreach	Requires a trained individual to be present when watercraft are being launched. At Freeman Lake, the low frequency of vessel launch events may make it difficult to appropriately size the program.	No

3.2 Recommendations

This section identifies the recommended management options for further consideration, the reasoning behind each recommendation, a description of those options, and a general assessment of cost. Most recommended options can be permitted without substantial additional study or design; a basic permitting cost of $10,000 to $15,000 should be assumed for those. Options requiring advanced study or design to evaluate feasibility or design and permit should be expected to have higher permitting costs; further information on these additional costs is provided in the descriptions for those options.

3.2.1 In-Lake Recommendations

Each in-lake management option was assessed for initial applicability and feasibility for addressing the management challenges at Freeman Lake. The results of this assessment are summarized in **Table 17**. Recommended actions are described in more detail in the following sections.

Table 17. Freeman Lake In-Lake Management Recommendations for Further Consideration

Approach	Recommend	Qualifications	Reasoning
Aeration or Circulation	Yes	Additional study needed to determine feasibility.	Approach could improve growing season dissolved oxygen concentrations in stagnant coves or deep waters of the lake.
Algaecides	Yes	For near-term control of excessive algae where other options not feasible.	Acts quickly and effectively but does not control source of excessive algal growth.
Barley Straw	No	None	Approach is still largely experimental with few documented success stories.
Benthic Barriers	Yes	For supplemental control of rooted plants over limited areas.	Provides excellent control of rooted plants. Could be useful near key recreational locations.
Bioaugmentation	No	None	Approach is still largely experimental with few documented success stories.
Biomanipulation	No	None	Low predictability of outcome with few advantages for this lake.
Dilution or Flushing	No*	Flushing potentially helpful at times.	The only current source of water for flushing is the Stony Brook diversion, whose value is limited by poor water quality and lack of control over diversion flow rate.
Drawdown – Permanent	No	None	Few advantages and many substantial impacts or drawbacks.
Drawdown - Seasonal	No	Could potentially be helpful if dam retrofitted with redesigned spillway or low level discharge control.	As dam and Stony Brook diversion are currently configured, would require high rate of active pumping and/or siphoning out of Freeman Lake for a long period each year. Other drawbacks further reduce value of this approach.
Dredging	No	Could potentially be helpful in the Stony Brook diversion inlet cove if the diversion flows were reduced or eliminated.	Dredging requires substantial investment but would not achieve sustained improvement in Freeman Lake due to high rates of sedimentation. Minimal nutrient reduction benefit due to low contribution from internal loading.
Fragment Barriers	Yes	Less useful if Stony Brook diversion is eliminated.	Provides a means of lowering the chance of introducing new invasive species and reducing the spread of existing ones.
Harvesting – Hand	Yes	Not recommended for large, established populations of nuisance species.	Simplest and least impactful approach for controlling small areas of water chestnut and pioneer infestations of submerged plants.
Harvesting – DASH	Yes	Best as a primary control measure for limited infestations of submerged plants or as follow-up to address regrowth after an herbicide treatment.	Best physical control measure for small to moderate areas of submerged plants. More efficient than hand harvesting.
Harvesting – Mechanical	Yes**	Could potentially be helpful if water chestnut is allowed to spread and establish dense beds.	Akin to mowing the grass for most plant species, which will grow back the same season. A primary exception is water chestnut.

Approach	Recommend	Qualifications	Reasoning
		May also be used to manage submerged species but primarily as biomass control when infestations are widespread. Where other management activities have already achieved good control, mechanical harvesting may be counter-productive.	"EcoHarvester" mechanical harvesters may reduce fragmentation of submerged species compared to traditional cutters but still leave root crowns and some viable fragments behind. These will regrow later the same season, in most cases.
Herbicides	Yes	Sonar (fluridone) may not provide effective control of target species in portions of the lake subject to frequent flushing.	Herbicides would be effective against the two primary submerged aquatic invasive species in Freeman Lake. They are the most cost-effective way to control established infestations over large areas.
Herbivores	No	None	Potential herbivores are either difficult to obtain and of limited effectiveness or illegal to release in Massachusetts.
Hydroraking	Yes	For supplemental control of rooted plants and debris over small areas only.	Ideal for clearing debris and plants from small immediate shoreline areas with high recreational access value (e.g., beaches).
Nutrient Inactivation	Yes	Low dose maintenance or stripping applications only.	Higher dose treatments are unlikely to be helpful due to low contribution of nutrients from the sediments (internal loading).
Oxygenation	Yes	Additional study needed to determine feasibility.	Alternative to aeration/circulation. Oxygenation could substantially improve growing season dissolved oxygen concentrations in deep waters of the lake.
Plant Competition	No	None	Low predictability of outcome with few advantages for this lake. Native species are present and likely to recolonize areas currently dominated by aquatic invasive species.
Sonication	No	Could potentially be helpful for keeping swimming areas clear of cyanobacteria.	Other reliable, faster, and less costly methods exist for addressing excessive algal growth.

*Recommend studying the feasibility of modifying or eliminating an existing source of flushing.
**Recommend for water chestnut control if scale of infestation grows beyond what can be harvested by hand. Can also be used for short-term biomass control of the topgrowth of submerged species.

The following in-lake management actions are recommended for further consideration by the Town in developing a management plan for Freeman Lake.

1. Aeration or Circulation

Aeration or circulation is used to treat problems with excessive algal growth and low dissolved oxygen concentrations, typically in small ponds or stagnant coves. However, this management approach can also be scaled up for larger water bodies. Air diffusers, aerating fountains, sidestream aerators, and water pumps are typical types of equipment that may be installed to directly introduce oxygen to or increase circulation in a lake or pond. These methods may also reduce internal loading by introducing oxygen to anoxic sediments and thereby preventing the release of iron-bound phosphorus.

Aeration is typically supplied using a compressor housed in a rustproof outdoor cabinet or small building installed on the shore. These compressors feed bottom-mounted diffusers, connected to the compressor by tubing. Air bubbles are generated from the diffusers, which introduces a modest amount of dissolved oxygen to the water column. Smaller bubbles tend to be more effective at introducing dissolved oxygen because they have a large surface area to volume ratio.

Circulation may be induced by the rising action of certain aeration methods or accomplished specifically using water pumps. In addition to making dissolved oxygen more readily available through movement of the water, circulation can also be used to induce mixing of lakes and prevent stratification due to differences in water temperature. Additionally, circulation may also inhibit the growth of algae by physical disturbance (turbulent flow) and reduction of light intensity (by circulating algal cells into deeper waters) for photosynthesis.

Aeration and circulation require a power source to operate and this usually means utility work will need to be a part of the project. Additionally, consideration should be given to operational noise, which can be mitigated through proper siting and design. Although solar-powered units are available, they are typically not powerful enough to be effective in lakes.

Aeration and circulation requires commitment to thoughtful design and operation over a long season. Underpowered systems and intermittent usage are the main culprits behind failure of this approach and may actually lead to worsening problems.

Costs

- The cost of aeration or circulation varies significantly depending on the system design, power requirements, and area targeted. Smaller units for individual coves should be expected to cost $15,000 to $25,000 each; larger circulation systems may run more than $100,000.
- Maintenance and operation costs of several thousand dollars per year (tens of thousands for very large systems) should also be anticipated.
- Larger projects, such as those that would aerate the deep hole or other substantial portion of the lake, should be preceded by a feasibility study to ensure that the design fully accounts for oxygen demand, volume, site constraints, and whether the best approach is one that preserves thermal stratification or destratifies the lake. Approximate costs for such a study are anticipated to be $30,000 to $60,000.

2. Algaecides

Algaecides are analogous to herbicides in many ways but primarily target algae and cyanobacteria. Application of algaecides results in almost immediate control of a broad spectrum of planktonic and filamentous algae. A variety of different algaecide formulations are available for use, including copper sulfate and chelated copper-based formulations (e.g., Captain and Cutrine), which will generally control most nuisance green algae and cyanobacteria species. Peroxide-based formulations (e.g., PAK 27) are also available for control of nuisance algae, although these tend to be more expensive. Water use restrictions associated with most algaecides are minimal and temporary. Some labels do not carry any restrictions.

Algaecides may be useful for short-term control of algal blooms or patches of filamentous algae on an as-needed basis. Although effective, algaecides treat only the symptom (i.e., excessive algae) and do not address the cause of algae blooms (i.e., excessive nutrients). Therefore, long-term improvements should not be anticipated from the use of algaecides alone.

Costs

- Costs for treatment vary by product but are likely to range from $300 to $600 per acre, although some specialty formulations may exceed this cost.

3. Benthic Barriers

Benthic barriers are negatively buoyant materials, usually in sheet form, which can be applied on top of plant beds to limit light, physically smother, and allow unfavorable natural chemical reactions to interfere with further development of plants. Benthic barriers are best used for providing control of nuisance, rooted aquatic plant growth on a localized basis.

Plant topgrowth under the barrier will usually die back after about a month of deployment, although it may take longer for root crowns of perennial species to succumb. Barriers of sufficient tensile strength can be moved to a new location once control has been achieved, if desired. However, the continued presence of barriers will restrict recolonization of the area, especially if the barrier is maintained on a regular basis to prevent accumulation of sediments and billowing.

Benthic barriers will generate both direct and indirect impacts to non-target species where they are deployed. This is due to the fact that benthic barriers are entirely non-selective, which means all plants in the treatment area are killed, including desirable native plants. Some less-motile invertebrates may also succumb directly to smothering. By smothering bottom sediments, barriers can also indirectly impact the invertebrate community within the treatment area, which may locally reduce food sources for fish. However, if used only over small areas, the overall impact to aquatic life is likely to be negligible.

Costs

- The cost for benthic barriers can exceed $3 per square foot for the initial material purchase and installation. Costs to maintain the benthic barriers vary by area covered and number of maintenance visits. However, a basic maintenance program that includes annual installation in spring and removal in summer or autumn would likely be on the order of $6,000 to $12,000.

4. Dilution or Flushing: Investigate Alteration of the Stony Brook Diversion Structure

Worden (1995) recommended maintenance of the Stony Brook diversion to allow for continued flushing of Freeman Lake. However, the value of the Stony Brook diversion for this purpose is now questionable for multiple reasons.

First, the Stony Brook diversion appears to be the overwhelmingly dominant source of annualized nutrient loading to Freeman Lake. Additionally, it also imports high indicator bacteria counts to Freeman Lake at times. Critically, the diversion channel may also not supply enough water during the critical summer recreation period to accomplish the objective of flushing at all. Instead, it may only add poor quality water to the lake, as was observed from June to October 2024, thereby exacerbating water quality issues. Finally, Stony Brook and its tributary water bodies are known to host a variety of aquatic invasive species. Whether Stony Brook was the source of Freeman Lake's existing aquatic invasive plant infestations is uncertain. However, given the large number of public access locations on upstream water bodies, it is likely to receive and transport seeds, fragments, and other propagules from those infestations toward Freeman Lake. If left unmitigated, continued inflows through the Stony Brook diversion channel will at the very least hamper the success of nuisance macrophyte control measures implemented in Freeman Lake. At worst, it will serve as a vector for new aquatic invasive species that could trigger further management issues in the lake.

Therefore, TRC recommends that the Town consider altering the Stony Brook diversion structure and channel to either improve control over the timing and volume of inputs or eliminate inflows from the diversion altogether. This could lead to substantial improvements in water quality, both due to the reduced inflow of pollutants as well as to the effective reduction of watershed size. The latter would put the lake's destiny more firmly in control of the Town and its residents, thereby making long-term management of the lake more feasible and cost-effective.

However, before undertaking such a project, further study will be needed to understand downstream flooding impacts and how alteration of the Stony Brook diversion structure or channel will affect the ability to maintain Freeman Lake water levels. Worden (1995) indicated that groundwater would be sufficient to maintain Freeman Lake at a residence (or detention) time of 1.87 years. However, this was a coarse estimate and a more thorough investigation of the hydrologic impact is recommended before any changes are made to the Stony Brook diversion structure or channel. Additionally, if Freeman Lake inputs become mostly driven by groundwater and local sub-watershed runoff, more focus will need to be placed on controlling loading from stormwater in order to realize the full benefits of Stony Brook diversion structure alteration.

Therefore, the first step to address this would be a feasibility investigation. This study could consist of stakeholder engagement, identification or confirmation of ownership of both the structure and water rights, outlining of a permitting pathway, and completion of initial hydrologic and hydraulic engineering assessments. It may also include design concepts, especially if feasible options are identified.

Costs:

- A feasibility study would be expected to cost between $70,000 and $100,000 depending on complexity of the scope. Overall project costs will depend on the outcome of the feasibility study and the alternative ultimately pursued for design, permitting, and implementation.

5. Fragment Barriers

Floating fragment barriers are mesh curtains positioned vertically in the water column to isolate existing infestations in small coves or at flow choke points, such as the Stony Brook diversion channel. In-lake, these can be very useful for containing fragments in small coves or near engineered controls (e.g., dam spillways), they are harder to use effectively in open water, particularly where passage for navigation is required. However, temporary fragment barriers may be helpful when used to prevent escape of fragments during submerged macrophyte harvesting operations.

These barriers are a passive measure and only help prevent the spread and establishment of new infestations; they do not reduce aquatic macrophyte growth in areas of existing infestation.

Costs

- Fragment barrier costs are almost entirely associated with the initial purchase of the material. Material costs may be expected to range from $10 to $25 per linear foot, depending on material used, plus additional costs for installation and periodic maintenance.

6. Harvesting – Hand

The simplest form of harvesting is hand pulling of selected plants. Depending on the target species and depth of the water at the targeted site, hand harvesting may involve boating, wading, snorkeling, or SCUBA diving. Pulled plants and fragments are placed in a mesh bag or container that allows for dewatering during transport and disposal of the vegetation. Hand harvesting of submerged vegetation aims to remove entire plants, including the roots, thereby preventing re-growth in subsequent seasons.

Hand harvesting can be extremely effective for small infestations of water chestnut. Although the total coverage of water chestnut in Freeman Lake is approximately four acres, the beds were still patchy in nature, rather than continuous across the entire area. Therefore, it is still likely to be manageable with hand harvesting as long as it is addressed beginning in 2025.

Hand harvesting of water chestnut should be conducted in at least two events, including a first pass in early to mid-July and a second pass approximately two to three weeks later. This will ensure the harvest is early enough to prevent seed drop while also avoiding the possibility that late-germinating and deeper water plants are missed during harvest because they have not yet reached the water surface.

Based on the observed extent, water chestnut has probably been present in Freeman Lake for a few years. Thus, a seed bank has likely become established in the sediments. This means that hand harvesting will need to be conducted for several years to exhaust the local seed bank. However, waterfowl, wildlife, the Stony Brook diversion, and visiting watercraft are all potential vectors of water chestnut seeds. Therefore, even once it has been nominally controlled, annual surveys and incidental harvesting will likely be needed to ensure that this plant does not regain a foothold in the lake.

Hand harvesting of water chestnut is one of the most readily accessible management activities because it is simple in concept and does not require particularly expensive or specialized equipment or skills to conduct. Therefore, it also lends itself to implementation by trained volunteers, particularly when the beds are still limited in size. However, TRC recommends that the work at least be coordinated by the Town to ensure that the target species is effectively pulled and properly disposed of.

Should water chestnut be allowed to spread within Freeman Lake and become further established, mechanical harvesting or chemical controls may first be needed to reduce the population to the point where hand harvesting is again a viable option.

Hand harvesting may also be used to selectively control pioneer infestations of small areas of re-growth of submerged plant species. Diver harvesting is well suited to these situations and can be both cost-effective and thorough. However, diver hand harvesting is not recommended for the control of established beds of submerged plants, even over smaller areas.

Costs:

- Typical costs for contractor-implemented water chestnut hand harvesting programs range from $2,000 to $2,500 per crew per day. Given the extent and density of water chestnut mapped in Freeman Lake, it is estimated that five to ten days of hand harvesting will be required in the first year. This implies that the annual cost of a hand harvesting program would range from $10,000 to $25,000 under current conditions, not including the recommended pre- and post-harvesting mapping.

- Diver harvesting programs would be carry a higher cost per day (closer to $3,000) and would be a less efficient operation than water chestnut harvesting.

7. Harvesting – DASH

Diver assisted suction harvesting (DASH) is similar to hand harvesting but more efficient because entire plants are fed into a suction hose and lifted to a collection vessel at the surface, thereby significantly reducing the time it takes for the diver to handle and return plants to the surface. DASH can also reduce the potential for release of plant fragments, as plants are not bagged until they arrive on the boat, at which point they can be more easily contained.

DASH could be used to provide precision control of target submerged aquatic plant species up to several acres in size. Except for pioneer or highly localized infestations, DASH is unlikely to result in full control after a single harvesting event. However, DASH costs within a targeted area would be expected to decline over time, as control is achieved.

Costs:

- Costs for DASH have risen in recent years, due to demand that has outpaced the availability of qualified operators. Daily rates of $3,500 to $4,000 should be anticipated. Clearing a dense bed one acre in size may take eight to twelve days, depending on the efficiency of the crew, distance from the offloading/stockpiling location, and environmental conditions. Therefore, approximate costs of $28,000 to $48,000 per acre would be expected for annual management of dense submerged macrophyte beds. Additionally, due to the high demand, it is recommended that DASH procurement begin as early in the year as possible.

- In addition to operational costs, the Massachusetts Waterways Program (Chapter 91) has determined DASH to be considered dredging even though DASH does not target removal of sediments. Therefore, projects within Chapter 91 jurisdiction may incur additional permitting costs beyond the typical NOI filing with the local conservation commission.

- In some cases, DASH may require a Section 404 permit from the Army Corps of Engineers. In these cases or where other federal actions (including permits and licenses) are involved, the Massachusetts 401 Water Quality Certification process could also be triggered. Therefore, DASH projects may incur additional design, permitting, and testing costs beyond the typical NOI filing with the local conservation commission.

8. Harvesting – Mechanical

Mechanical harvesting involves cutting or pulling (by means of a rotating drum) of aquatic plants from a specially equipped watercraft. Mechanical harvesters often include conveyor systems to maximize efficiency in collection and offloading of material. Overall, this is the most efficient form of harvesting for short-term control. It is particularly well-suited to removing large areas of water chestnut or larger floating plants.

Most harvesters require water depths of at least three feet, although some smaller ones can operate in waters as shallow as two feet. However, mechanical harvesting is a non-selective method, meaning that non-target plants (and associated aquatic animal life) in the managed area will also be impacted to some degree. Additionally, mechanical harvesting does little to prevent regrowth of most plants in subsequent seasons.

Mechanical harvesting could potentially be used for short-term control floating plants. However, certain logistical challenges, including access for the harvester and identification of dewatering and offload areas would need to be resolved for mechanical harvesting to be implemented. Mechanical harvesting should be avoided in late summer and autumn, when benefits are limited and plants are more likely to fragment or drop seed.

Costs:

- Costs for mechanical harvesting can be expected to run several thousand dollars per day plus an initial mobilization fee. However, mechanical harvesting is efficient at removing biomass compared to hand harvesting or DASH. Therefore, fewer days of operation would be required to clear the same area of plants, resulting in lower short-term costs. Still, over the long term, mechanical harvesting may be less cost-effective than DASH for control of rooted submerged macrophytes, including fanwort and Eurasian milfoil.

- In addition to operational costs, the Massachusetts Waterways Program (Chapter 91) may consider mechanical harvesting to be dredging because it involves removal of plant matter, even though it does not target removal of sediments. Therefore, projects within Chapter 91 jurisdiction may incur additional permitting costs beyond the typical NOI filing with the local conservation commission.

- In some cases, mechanical harvesting may require a Section 404 permit from the Army Corps of Engineers. In these cases or where other federal actions (including permits and licenses) are involved, the Massachusetts 401 Water Quality Certification process could also be triggered. Therefore, mechanical harvesting projects may incur additional design, permitting, and testing costs beyond the typical NOI filing with the local conservation commission.

9. Herbicides

In the short-term, herbicide treatment is usually the most cost-effective means by which to rapidly achieve the goal of reducing aquatic weed biomass over a large area. Herbicides may also be used over the long-term as part of a comprehensive management plan to treat areas of recurring infestations that are not readily controllable through other means.

Although no herbicide is completely without risk, a premise of pesticide regulation is that the potential benefits derived from use outweigh the risks when registered herbicides are applied according to label recommendations and restrictions. Treatment by certified professional applicators, which is required in Massachusetts for aquatic treatments, helps to ensure that label recommendations are followed and risks minimized. Additionally, rigorous herbicide registration procedures and improved application equipment have further improved the relative safety of using these chemicals for nuisance aquatic plant control. Many of the newer aquatic herbicides have favorable toxicological profiles and some are considered to be practically non-toxic to a number of non-target species. Therefore, direct impacts to non-target species are usually minimal or able to be mitigated through dosage rate or use of spot treatments. Indirect impacts (e.g., sags in dissolved oxygen as plant dieback occurs) also need to be considered. However, these impacts can be managed through appropriate selection and application of herbicides, as well as adequate monitoring and the resulting management adjustments. Label restrictions are typically limited to irrigation with few or no restrictions on use for primary recreation, boating, fishing, or drinking. However, it is customary to post an advisory restriction on public recreation for the day of treatment, primarily to prevent direct user conflicts during treatment activities.

Herbicides can be classified by many different means. However, one of the most useful classifications for lake management purposes is systemic versus contact herbicides. Systemic herbicides generally require longer contact times but, once they are taken up, are effective in killing all parts of the plant. This typically results in effective control for two or more years following treatment. Additionally, a benefit of the longer contact time required is that plant dieback tends to occur more gradually within treated areas, resulting in less opportunity dissolved oxygen sags that could impact non-target species. Contact herbicides generally require minimal contact time to be effective. However, they are only effective on the parts of the plant that actually come into contact with the herbicide. This means that contact herbicides tend to achieve only single-season control of perennial plant species. Additionally, due to the rapid dieback induced by contact herbicides, they generally should not be used for lake-wide control of aquatic plant growth all at once, especially where dissolved oxygen levels are marginal during the growing season, as they are in Freeman Lake.

Should the Town desire to implement a herbicide control program, the following herbicides would provide control of the non-native species observed.

<u>Diquat dibromide</u> (various trade names) – contact herbicide

Diquat dibromide, also known as diquat or by its trade names (e.g., Tribune, Reward) works quickly by interrupting the photosynthetic process, resulting in the dieback of leaf and stem cells. As a contact herbicide, it offers immediate control of curly-leaf pondweed, brittle naiad, and Eurasian milfoil. However, diquat is not effective against fanwort or water chestnut.

As with any contact herbicide, diquat only kills the exposed parts of the plant (leaves and stem). The roots and crowns typically survive and put out another flush of growth in the following year (or even later in the same season). Therefore, it is best applied as spot treatments for short-term control.

Florpyrauxifen-benzyl (ProcellaCOR) – systemic herbicide

Florpyrauxifen-benzyl (trade name ProcellaCOR) is a reduced risk systemic herbicide that acts as an auxin mimic. Auxin is a key plant hormone that regulates growth processes; herbicides that mimic auxin are able to control target species by disrupting these processes. In certain dicot plant species auxin mimics can be very effectively translocated throughout the plant, allowing the growth disruption to impact the overall plant and eventually resulting in death.

In Massachusetts, ProcellaCOR is most frequently used for systemic control of non-native milfoils, including Eurasian milfoil, which is widespread in Freeman Lake. The primary advantages of ProcellaCOR include its selectivity and minimal contact time requirement. This allows it to be very effective on target species, even in highly flushed systems, with negligible impacts to non-target species. It can also be applied relatively late in the season and still be effective, which provides more flexibility on its use.

ProcellaCOR is not effective on fanwort or water chestnut.

Fluridone (Sonar) – systemic herbicide

Fluridone (trade name Sonar) is a systemic herbicide that acts as a carotenoid biosynthesis inhibitor, effectively leading to the depletion of chlorophyll. This results in chlorosis (bleaching) and the eventual starvation of the entire plant. Fluridone is highly effective on fanwort and Eurasian milfoil, even at low concentrations, with minimal impact to other plants. However, these target fluridone concentrations must be maintained for a relatively long period of time (up to 90 days) to achieve effective systemic treatment. One side benefit of this slow action is that it attenuates the plant tissue decay process, thereby avoiding spikes in dissolved oxygen demand that sometimes occur during rapid plant die-off. Fluridone remains one of the more expensive herbicides on the market, primarily due to the need for booster treatments to maintain the required concentration of the herbicide over time.

While it would be difficult to achieve good results with fluridone near the Stony Brook diversion inlet (due to continuous dilution from incoming flows), it may be possible to achieve desired results elsewhere in the lake. However, to achieve maximum effectiveness, fluridone treatment should begin early in the growing season (April or May) before biomass has fully had a chance to develop. Additionally, the use of slow-release pelleted formulations may be necessary to ensure that the necessary concentrations can be achieved over the long contact time required.

Flumioxazin (various trade names) – contact herbicide

Flumioxazin (trade name Clipper) is a fast-acting contact herbicide and works by inhibiting protoporphyrinogen oxidase (PPO), an enzyme necessary for photosynthesis. Inhibition of PPO causes destruction of plant cell plasma membranes in the presence of sunlight, resulting in rapid dieback of plant tissues. As might be expected, plant cells not directly exposed to the agent or sunlight (e.g., roots) are not killed by flumioxazin. Therefore, plants with sufficient energy reserves may re-grow from the roots during the subsequent growing season.

Although flumioxazin does not provide systemic control, its's primary advantage is that it is effective on fanwort and requires very little contact time to be effective. It can also be successfully applied in summer. Therefore, it can be a useful tool for spot treatments to address areas that are difficult to control via other means.

Imazamox (Clearcast) – systemic herbicide for foliar application above the water only

Imazamox (trade name Clearcast) is a systemic herbicide that acts as an acetolactate synthase inhibitor. Imazamox is readily translocated from the leaves to the rest of the plant and, as such, can be highly effective at low concentrations. However, they must be applied when the plants are in active growth mode to have the desired systemic impact. This herbicide is effective on many floating-leaved plants when applied as a foliar spray. When it is applied to water, it acts more as a growth regulator, slowing but not necessarily killing targeted species. In practice, imazamox is used more often as a foliar spray in Massachusetts and would only be used in that manner at Freeman Lake.

Although the water chestnut population in Freeman Lake appears to be limited enough that it can still be effectively controlled through hand harvesting, imazamox provides a chemical control alternative in case mechanical means are unsuccessful or not seen as feasible by the Town.

Costs:

- Diquat dibromide is the least expensive herbicide and can be expected to cost $300-$400/acre.
- ProcellaCOR dosing is very sensitive to volume (not just area) and therefore costs are more difficult to estimate. However, a cost of at least $1,000/acre should be anticipated.
- Sonar treatments are typically $800-$1,200/acre depending on total area treated and number of booster treatments needed.
- Flumioxazin treatments can be expected to be $700-$1,000/acre.
- Imazamox treatments require at least two visits to apply properly, which increases cost. Approximate treatment costs are anticipated to be $900-$1,200/acre.

10. Hydroraking

Hydroraking uses a backhoe-like machine mounted on a barge to remove plants directly from lake sediments. Depending on the attachment used, plants are scooped, scraped, or raked from the bottom and deposited on shore for disposal. Hydroraking is most useful for local control of water lilies and other plants with large rhizomes or tubers, as it can physically remove or destroy the bulky portions of the plant. Hydroraking can also be used to remove debris around beaches or other key recreational areas.

Hydroraking is typically not recommended for control of vegetatively reproducing species, including most submerged aquatic plants. It is also a slow process, often requiring days to clear each acre. Additionally, the rake attachments are coarse tools that would be expected to capture bycatch of non-target aquatic plants and animals (primarily invertebrates).

Costs:

- Hydroraking is one of the cost-intensive management activities to implement. Mobilization costs alone are typically run several thousand dollars. Operational costs depend on a number of factors, including density of plants/debris, distance of target areas from the dewatering/stockpiling location, and the dimensions of the area to be managed. However, an approximate cost of $10,000 to $18,000/acre should be expected.
- In addition to operational costs, the Massachusetts Waterways Program (Chapter 91) may consider hydroraking to be dredging because it involves removal of plant matter and detritus, even though it does not target removal of sediments. Therefore, projects within Chapter 91 jurisdiction may incur additional permitting costs beyond the typical NOI filing with the local conservation commission.

- In some cases, hydroraking may require a Section 404 permit from the Army Corps of Engineers. In these cases or where other federal actions (including permits and licenses) are involved, the Massachusetts 401 Water Quality Certification process could also be triggered. Therefore, hydroraking projects may incur additional design, permitting, and testing costs beyond the typical NOI filing with the local conservation commission.

11. Nutrient Inactivation

Given the low contribution of internal phosphorus loading, relatively shallow waters, and high rate of flushing Freeman Lake is not considered a good candidate for long-term, sediment-targeted nutrient inactivation. However, low dose treatments could potentially be of use for water column stripping or maintenance.

Low dose nutrient inactivation treatments are similar to sediment nutrient inactivation but involve much smaller applications that are primarily targeted at stripping phosphorus and particulates (including algae and suspended sediments) from the water column. Unlike algaecide treatments, nutrient inactivation addresses the proximal cause of nuisance algal blooms, which is the excess availability of nutrients. Therefore, it provides benefits above and beyond those of algaecide treatments or other control methods that simply target algal cells (e.g., sonication).

Although other nutrient inactivation agents are available, alum and sodium aluminate are the two most commonly used in Massachusetts. These have a long track record of successful use and are generally more economical to apply than other materials, although polyaluminum chloride (PAC), aluminum chlorohydrate (ACH), zeolite formulations (e.g., Aqual P), and rare earth (lanthanum)/bentonite clay formulations are also available.

Low-dose nutrient inactivation programs are generally implemented in one of two ways.

The first type of low-dose treatment program is proactive in nature. It involves scheduled low-dose treatments on a periodic basis, typically once a year in spring or early summer prior to the development of an anticipated bloom or an important recreational period (e.g., beginning of school vacation). Although water quality monitoring is usually incorporated into this kind of program, it is primarily used to track results rather than as a basis for timing of treatment. This type of program is most appropriate where algae blooms recur on a fairly predictable basis or recreational needs require predictability in water quality conditions.

The second type of low-dose treatment program is responsive. This type of management program will usually rely on monitoring of water quality or biological conditions to identify the need for a treatment. Typical triggers for treatment include a sustained spike in phosphorus concentrations, a sudden drop in Secchi transparency, and/or a shift in algal community composition toward dominance by cyanobacteria. Frequent or even continuous monitoring of conditions is best, as algae blooms can develop rapidly and mobilization for treatment may take several days to a week or more, depending on contractor availability and material supplies. This type of program is most appropriate where algae blooms are infrequent, treatment timing is flexible, and/or a strong monitoring program is in place. However, one limitation of this type of program is that low-dose treatments are not recommended during periods of high environmental stress, such as high water temperatures and low dissolved oxygen. This usually excludes the peak recreation months of July and August.

Although a certain level of planning, design, and monitoring is required to ensure a successful low-dose nutrient inactivation, application is relatively straightforward and presents fewer logistical challenges than sediment nutrient inactivation. A low-dose treatment can be applied from a smaller vessel in a fraction of the time required for an alum treatment targeting inactivation of sediment phosphorus.

Given that Freeman Lake is a moderately shallow lake with a high flushing rate, the improvements from individual nutrient inactivation doses would likely be short-lived, although the benefits would be expected to last longer during dry summers when water levels remain below the spillway for an extended period.

Costs:

- Nutrient inactivation costs are largely driven by the commodity markets and have been highly impacted by changes in trade policies over the last few years. However, a minimum cost of $2,000/acre should be anticipated. For the purpose envisioned here, the treatment would likely only be partial lake.

Oxygenation

Oxygenation is similar in concept to aeration, in that it targets improvement of in-lake dissolved oxygen concentrations. However, hypolimnetic oxygenation specifically targets the bottom of the water column in a way that does not destratify the lake. Therefore, it can be highly appropriate where restoration of coldwater fisheries habitat is desired. It is also very effective at reducing internal phosphorus loading from the sediments, when iron is abundant and internal loading represents a large portion of the total load.

At Freeman Lake, oxygenation could potentially be beneficial for alleviating hypolimnetic anoxia. However, due to the relatively low rates of internal phosphorus loading at Freeman Lake, oxygenation will likely only provide a marginal benefit in the reduction of nutrients. Still, it is recommended that oxygenation be considered for its potential to substantially improve dissolved oxygen concentrations.

Oxygen can be passively supplied by a land-based tank that holds liquid oxygen. Alternatively, it can be actively supplied by an oxygen generator coupled with a pump (oxygen saturation technology or OST) and injected. Previous designs required water to be pumped out of the lake where it was then saturated with oxygen at a land-based location and returned to the lake.

However, newer designs provide the option of saturating water in a chamber housed within the lake itself, thereby theoretically improving the efficiency and efficacy of the process.

Given the various design options and requirements for some sort of land-based facility, TRC strongly recommends completing a feasibility study prior to implementation of an oxygenation system.

Costs:

- The cost of oxygenation varies significantly depending on the system design, power requirements, and area targeted. However, Freeman Lake would likely require a larger system, which may run several hundred thousand dollars.
- Maintenance and operation costs of several thousand dollars per year should also be anticipated.
- Oxygenation projects should be preceded by a feasibility study to confirm that this approach will be successful and identify the best way to deliver oxygen (passive diffusion from a tank, onsite generation, etc.). Approximate costs for such a study are anticipated to be $30,000 to $60,000.

3.2.2 Watershed Recommendations

Each watershed management option was assessed for initial applicability and feasibility for addressing the management challenges at Freeman Lake. The results of this assessment are summarized in **Table 18**. Recommended actions are described in more detail in the following sections.

Table 18. Freeman Lake Watershed Management Recommendations for Further Consideration

Approach	Recommend	Qualifications	Reasoning
Nutrient Inactivation (Dosing Station)	Yes	Requires an initial feasibility study. If the Stony Brook diversion can be modified or eliminated, this approach may no longer be applicable.	Expedites a reduction in nutrient loading when sources are overwhelming or otherwise uncontrollable.
Public Education and Outreach	Yes	None	This is a necessary component of any successful lake management program. Behavioral changes that result can provide marginal improvements.
Resident Waterfowl Control	Yes	None	Resident waterfowl contribute both nutrients and bacteria to Freeman Lake and serve as a host for the schistosomes that cause swimmer's itch.
Shoreline Road Maintenance	Yes	None	Good housekeeping measures are both required under the Massachusetts Small MS4 General Permit and advisable to prevent discharge of pollutants to Freeman Lake.

Approach	Recommend	Qualifications	Reasoning
Septic System Improvements or Sewering	N/A	Would be recommended for any properties within the Local Sub-watershed that are still on septic.	Areas identified by Worden (1995) have been sewered.
Stormwater Controls	Yes	None	Stormwater is not currently the primary source of nutrient loading to Freeman Lake. However, it is still a concentrated watershed source and may have greater impacts during periods of low water.
Watercraft Inspections	Yes	Motorized vessels are not permitted on Freeman Lake, so a modest inspection program may be sufficient.	Visiting watercraft are a potential vector for the introduction of aquatic invasive species.

The following watershed management actions are recommended for further consideration by the Town in developing a management plan for Freeman Lake.

1. **Nutrient Inactivation (Dosing Station)**

Ideally, external loading of nutrients to Freeman Lake would be reduced through watershed controls. However, this will be very difficult in practice as long as the Stony Brook diversion remains active. The diversion substantially increases the effective watershed size of Freeman Lake, most of it outside of Chelmsford’s control.

A dosing station would allow for immediate improvements in nutrient loading by directly injecting a flocculant and binding agent (typically polyaluminum chloride) into inflowing water from the Stony Brook diversion. This would capture phosphorus in a way that remains stable under a wide variety of naturally occurring conditions (see Nutrient Inactivation description under In-Lake Options for more details). In contrast to in-lake nutrient inactivation, a dosing station would target phosphorus before it reaches the lake.

The two primary advantages of a dosing station are that it would immediately reduce external loading of phosphorus to the downstream lake and cost far less per kilogram of phosphorus removed than other watershed approaches. Since a dosing station would be able to inject polyaluminum chloride (or the selected binding agent) as it is needed over a long period of time, it has potential be effective in managing persistent excessive nutrient issues. In the Freeman Lake system, a dosing station would allow the diversion flows to provide an improved flushing function because the concentrations of phosphorus flowing into the lake would be lower.

To optimize operational costs, the dosing station could be programmed to inject only during high-impact loading events, such as storm flows when water levels are below the spillway elevation.

Prior to undertaking any nutrient inactivation program, additional investigation would be required to determine the feasibility of implementation and develop a conceptual design at one or more proposed sites.

Costs:

- A feasibility study could be completed for approximately $40,000 to $60,000.
- If determined to be feasible, additional costs should be anticipated for design. In addition to permitting through the local conservation commission, NPDES permitting may also be required. These additional costs would be better defined as part of the feasibility study but may run tens of thousands of dollars.
- Similarly, additional costs for construction and operation and maintenance would be better defined through the design and permitting process.

2. Public Education and Outreach

Public education and outreach will raise awareness of issues at Freeman Lake and encourage public involvement in its protection and management as a community resource, particularly with regard to extension of benefits from other management actions that may be implemented.

Education and outreach may take many forms. These may include content on hosted on the Town website, social media postings, targeted mailings, incorporation into school programs, community events, installation of informational signs or kiosks at public access locations, interviews with local community “influencers,” or other approaches.

Organized public participation programs may provide an enhanced opportunity for members of the public to take a more active role in supporting improvement of Freeman Lake. Examples may include labeling of storm drains, replanting of native plants on public lands or rights-of-way, or development of a citizen water quality monitoring program. Additionally, the Massachusetts Weed Watcher program, sponsored by the Department of Conservation and Recreation Lakes and Ponds Program, provides training and technical assistance to public groups interested in monitoring their lakes for exotic species of aquatic plants.

Costs:

- Costs to implement public education and outreach programs vary, depending on the approach and number of people or households targeted. However, they tend to be low compared to the costs of other management approaches.

3. Resident Waterfowl Control

Large resident Canada Goose populations have become established in eastern Massachusetts over the last 60 years, where hunting restrictions, shoreline development, and feeding by the public have allowed resident geese to thrive. High densities of resident geese can result in measurable nutrient and bacteria loading to surface waters. Additionally, resident goose flocks can become aggressive toward people and obstructive to vehicular traffic on nearby roads. Furthermore, waterfowl serve as a host for the schistosome responsible for causing swimmer’s itch. Although TRC did not directly observe large groups of resident waterfowl on the dates of our visits, they are present at Freeman Lake.

Canada Goose populations can be managed by both active and passive measures. In most cases, some combination of the two is necessary to reduce local flock size or at least mitigate impacts, which mainly arise from defecation along unvegetated portions of the shoreline or in the waters of the lake.

A few examples of active and passive control options are described in this section. However, this list is not exhaustive.

Egg addling or oiling is an active measure that seeks to reduce the viability of goose eggs without destroying the nest. When successful, geese will continue to incubate the non-viable eggs long enough that that they do not attempt to nest again that year. Over time, this reduces the locally grown population of geese. This activity can be implemented by trained volunteers but requires effort to locate nests each year.

Goose harassment is another active measure that involves the generation of loud noises or canine patrolling of favored areas to disturb geese and discourage them from persisting in these areas. Over time, the frequency of harassment may be decreased as geese learn to avoid these areas. The Town currently contracts with a canine goose control contractor to discourage geese from congregating in Town-owned recreational fields near the lake.

Raising the cutting height on lawnmowers and/or reducing mowing frequency is the simplest passive measure to discourage goose grazing. Geese find taller grass to be less palatable and gravitate to closely cropped lawn areas instead. This method would also have the added benefit of reducing the time and money spent on landscape maintenance by shoreline residents. It would also help to attenuate direct runoff and pollutant loading from adjacent properties into the lake.

Chemical repellents are another passive measure that makes grass less palatable to geese. However, these need to be reapplied frequently over a long period of time to be effective.

Decoys, often in the form of owls, coyotes, or other shapes/patterns that simulate predators are a popular passive measure that typically achieves little success in managing resident waterfowl populations. Although geese may initially avoid areas near decoys, they quickly learn that the simulated predators are not a real threat. Moving or switching decoys every few days may improve effectiveness.

Finally, installation of fencing or re-landscaping the immediate shoreline to incorporate a buffer of shrubs and larger herbaceous plants is a passive measure that forms a barrier to goose movement during the vulnerable summer molting season. When geese molt, they are unable to fly over barriers and avoid passing between obstacles that obscure their vision of potential predators. If fencing is used, it must extend the entire perimeter of the open shoreline transition area (and extend up along property boundaries, if the neighboring property is unfenced). Fencing must be at least 30 inches tall with the first rail no more than 12 inches above the ground to be effective. Benches, stones, or other objects that form a similar barrier may also be added to break up the fenceline and provide greater visual interest or enhance passive recreational opportunities. Gates may also be installed to allow human access while preventing goose passage. If vegetation is used to form the barrier, it must also be at least 30 inches tall and form a strip at least 6 feet wide, although narrow footpaths between vegetated areas may be maintained to allow people to access the lake. Vegetation may be selected to enhance both aesthetic interest and wildlife value. Vegetative barriers are a particularly attractive option because the also provide nutrient uptake and attenuate direct runoff from adjacent parcels into the lake.

Costs:

- Costs to implement resident waterfowl control are typically negligible to low.

4. **Shoreline Road Maintenance**

This management option was originally highlighted in Worden (1995) in response to the need for more effective maintenance of shoreline roads and haybales that had been deployed to prevent runoff from eroding shorelines and carrying pollutants directly into the Freeman Lake. Since the time of that report, shoreline road maintenance issues appear to have improved. Additionally, the Massachusetts Small Municipal Separate Storm Sewer System (MS4) General Permit, which applies to the Town of Chelmsford's stormwater system explicitly includes a Good Housekeeping element (e.g., street sweeping, catch basin cleaning).

Although shoreline road maintenance issues have improved, it is recommended that this management action continue to be implemented with additional improvements as possible, for the benefit of Freeman Lake.

Costs:

- Costs for good housekeeping actions are likely already built into municipal budgets. Substantial additional costs are not anticipated at this time.

5. **Stormwater Controls**

External sources contribute the most substantial portion of the annual nutrient loads to Freeman Lake. Even incremental development can take a significant toll on water quality if not effectively managed as the watershed is further developed. As such, stormwater retrofits, Best Management Practices (BMPs), and other structural or non-structural improvements may be helpful in minimizing external pollutant loading.

External nutrient loading can be mitigated to some degree through watershed controls, especially when enforced and implemented as a condition for new or re-development. However, once watershed land is developed, watershed controls become increasingly difficult to implement and typically require large-scale disconnection of impervious surfaces or retrofits to achieve even small reductions in nutrient, sediment, or bacteria loading. Retrofits can be effective but typically cost many times more to construct and maintain than other means of addressing pollutants.

Other watershed measures, including agricultural and forestry BMPs, can also reduce the amount of nutrient loading from non-urbanized land. Because so little of the greater watershed is located in Chelmsford and the part that is has limited Town-controlled parcels, work toward implementation is most likely to take the form of coordination with state agencies, non-governmental organizations, and private individuals.

In the local sub-watershed, this study found the highest contributions of phosphorus from Outfalls 1 and 2, which drain the Route 40 and the Adams Street areas, respectively. Phosphorus concentrations in discharge from both of these outfalls were substantially higher than those found in Freeman Lake. Nitrogen was highest at Outfall 1 (Route 40) and substantially higher than any of the samples collected from Freeman Lake or the Stony Brook diversion channel. Although sampling was limited to a single round, these results suggest that there may be reason to prioritize stormwater control efforts in these two areas.

Costs:

- Costs to implement retrofits, BMPs, and other improvements vary widely, depending on the type, size, site constraints, need for professional services (e.g., engineering), and amount of pollutant removal desired. However, costs per unit weight of pollutant removed are often among the highest of any management approach. For example, a cost of several thousand dollars per kilogram removed would not be unusual for phosphorus.

6. Watercraft Inspections

The goal of watercraft inspections is to prevent the introduction and spread of aquatic invasive species by vessels, which are a documented vector. Inspectors greet visitors at public access locations and ask to inspect boats and trailers for aquatic invasive species before they are launched. Inspections can also include informal questions or a more formal questionnaire to assist with the inspection. Typically, these inspections are voluntary to encourage the public to see them as helpful and collaborative, rather than limiting or punitive. Making inspections voluntary also allows them to be completed by trained volunteers.

Locations where inspections may be worthwhile include the Shore Drive access and potentially the Freeman Lake Beach, where vessels are allowed to launch outside of the swim area.

Costs:

- Costs would likely be minimal to implement this kind of program, if conducted by volunteers. If the Town were to provide these services, there would be costs associated with staffing and supplies for informational materials.

3.3 Summary of Recommendations

The recommended in-lake and watershed management approaches for further consideration at Freeman Lake are presented in **Table 19**.

Table 19. Summary of Recommended Management Actions and Costs

Location	Approach	Action	Order of Magnitude Cost Estimate*
In-Lake	Aeration or Circulation	Undertake feasibility study. Design, permit, and install unit(s). Operate and maintain system.	\$30,000 to \$60,000 \$100,000+ \$10,000+ (annual)
	Algaecides	Permit treatments. Treat if/when needed.	\$10,000 to \$15,000 \$5,000 to \$10,000 (annual)
	Benthic Barriers	Permit and install benthic barriers as part of a pilot study.	\$15,000 to \$20,000
	Dilution or Flushing: Investigate Alteration of the Stony Brook Diversion Structure	Undertake feasibility study. Design, permit, and construct project.	\$70,000 to \$100,0000+ Highly variable costs – will depend on findings of feasibility study.

Location	Approach	Action	Order of Magnitude Cost Estimate*
		Operate and maintain new system.	Dependent on alternative selected for implementation.
	Fragment Barriers	Permit and install fragment barriers on inlet from Stony Brook diversion. Maintain fragment barriers.	$10,000 to $15,000 $5,000 (annual)
	Harvesting – Hand	Permit harvesting program with a focus on water chestnut. Harvest and dispose of biomass.	$10,000 to $15,000 $10,000 to $25,000 (annual)
	Harvesting – DASH	Permit DASH program with a focus on fanwort and Eurasian milfoil. Harvest and dispose of biomass.	$15,000 to $20,000 $28,000 to $48,000 per acre (annual) or $350,000+ (annual) to address entire area of target species growth.
	Harvesting – Mechanical	Permit mechanical harvesting program with a focus on short-term biomass reduction. Harvest and dispose of biomass.	$15,000 to $20,000 $2,000 to $3,500 per acre plus $4,000 to $8,000 mobilization.
	Herbicides	Permit treatments. Treat target species beds.	$10,000 to $15,000 $300 to $1,200 per acre, depending on product used. $80,000+ for a lakewide systemic treatment (i.e., Sonar[fluridone]). $20,000 to $30,000 (annual) for spot treatments of existing beds
	Hydroraking	Permit hydroraking program with a focus on key recreational shorelines. Implement hydroraking.	$15,000 to $20,000 $15,000+ (annual)
	Nutrient Inactivation	Permit low-dose nutrient inactivation program. Apply low-dose treatment.	$10,000 to $15,000 $50,000+ (annual) for partial lake treatment
	Oxygenation	Undertake feasibility study. Design, permit, and install unit(s). Operate and maintain system.	$30,000 to $60,000 $350,000+ $10,000+ (annual)
Watershed	Nutrient Inactivation (Dosing Station)	Undertake feasibility study. Design, permit, and construct station. Operate and maintain system.	$40,000 to $60,000 Variable but anticipate minimum of $350,000. Variable but anticipate minimum of $50,000+ (annual)

Location	Approach	Action	Order of Magnitude Cost Estimate*
	Public Education and Outreach	Identify additional public education and outreach needs	Varies but minimal additional costs anticipated.
	Resident Waterfowl Control	Continue active goose harassment program on Town recreational area parcels near the lake. Consider addition of passive measures, if needed.	Varies but minimal additional costs anticipated. Some passive measures can reduce operations and maintenance costs.
	Shoreline Road Maintenance	Continue to address with good housekeeping measures.	Negligible to minimal additional costs beyond what is required for compliance with Small MS4 General Permit.
	Stormwater Controls	Additional investigation of high priority outfalls/sources and development of concept designs. Design, permit, and construct high priority controls. Operate and maintain controls.	\$75,000 to \$100,000 Highly variable costs – will depend on findings of additional studies and the designs developed in response. Dependent on designs selected for implementation.
	Watercraft Inspections	Develop and implement voluntary watercraft inspection program.	Minimal additional costs anticipated.

*Some permitting costs may be shared across multiple approaches if permitted as part of a comprehensive lake management program. This could result in substantial savings.

Many of these approaches will require additional study over the long term to fully vet, fund, design, permit, and implement. However, in the near term, the following prioritized actions are recommended for implementation as soon as possible:

1. **Initiate a water chestnut hand harvesting program.**

   This action will be critical to containing the existing infestation and preventing it from expanding throughout shallow portions of the lake. If the infestation is allowed to increase in extent and density, it may require higher level and more impactful interventions, such as herbicide treatment or mechanical harvesting.

   Water chestnut hand harvesting should begin once rosettes fully reach the water surface (typically the first half of July) and be complete before seed drop starts in late summer.

2. **Use targeted herbicide treatments to address nuisance aquatic plant growth in key recreational areas.**

   This action will allow the Town to quickly address nuisance submerged aquatic plant growth in areas where it poses a safety risk (e.g., near the swimming beach) or otherwise severely precludes use of key recreational areas in the lake.

   The most appropriate herbicide to use for these target spot treatments will depend on the specific location and mix of species occurring there. However, for areas where Eurasian milfoil is the only nuisance species present, diquat could be used as a short-term (single season) control method or florpyrauxifen-benzyl (ProcellaCOR) could be used for systemic control. Where fanwort mixes in, flumioxazin (sometimes applied with diquat to reduce costs and improve effect on some species) would be a more appropriate option for short-term control.

3. **Undertake a pilot study using benthic barriers to control nuisance aquatic plant growth in shallow waters along key recreational shoreline areas.**

   This action will give the Town the opportunity to evaluate the feasibility of benthic barriers as a non-chemical nuisance aquatic vegetation control method for small areas of shoreline. If the pilot study is successful, the Town could consider a broader use of benthic barriers could be used to provide sustained control of vegetation in key areas over the long term.

These actions are likely to require an Order of Conditions from the Chelmsford Conservation Commission to implement. Additionally, herbicide use will require the Town's selected contractor to obtain a separate permit from MassDEP. Therefore, permitting should be initiated as soon as possible to ensure procurement and implementation in a timely manner.

Beyond 2025, TRC recommends budgeting to continue to implement the three prioritized actions above, at a minimum. However, these actions only target limited areas of nuisance aquatic plants and do not address water quality. Therefore, TRC recommends that the Town concurrently work to select a preferred long-term and comprehensive management program from among the recommended in-lake and watershed approaches. Once a comprehensive management program has been identified, the Town will be able to develop a long-term budget and seek funding to design, permit, and implement the program.

4.0 References

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5.0 Glossary of Basic Limnological Terms

Abiotic: A term that refers to the nonliving components of an ecosystem (e.g., sunlight, physical and chemical characteristics).

Algae: Typically microscopic plants that may occur as single-celled organisms, colonies or filaments.

Anoxic: Greatly deficient in oxygen and unable to support most aquatic life forms.

Aquifer: A water-bearing layer of rock (including gravel and sand) that will yield water in usable quantity to a well or spring.

Aquatic plants: A term used to describe a broad group of plants typically found growing in water bodies. Most often applied to submerged, floating, and floating-leaved plants.

Bacteria: Typically single celled microorganisms multiply by simple division and occur in various forms. Cyanobacteria are a photosynthetic type of bacteria. Some bacteria may cause disease, but many do not and are necessary for fermentation, nitrogen fixation, and decomposition of organic matter.

Bathymetric Map: A map illustrating the bottom contours (topography) and depth of a lake or pond.

Best Management Practices: Any of a number of practices or treatment devices that reduce pollution in runoff via runoff treatment or source control.

Biomass: A term that refers to the weight of biological matter. Standing crop is the amount of biomass (e.g., fish or algae) in a body of water at a given time. Biomass is often measured in grams per square meter of surface.

Biovolume: Analogous to biomass but expressed in terms of volume rather than mass.

Biota: All living organisms in a given area.

Chlorophyll a: A pigment used by higher plants and certain algae for photosynthesis. Measuring the level of this pigment in surface water is one way of describing the productivity of a pond and determining its trophic state (see Eutrophic).

Cultural Eutrophication: The acceleration of the natural eutrophication process caused by human activities, occurring over decades as opposed to thousands of years.

Ecosystem: An interactive community of living organisms, together with the physical and chemical environment they inhabit.

Epilimnion: In a thermally stratified lake, refers to the warmer, well-mixed upper layer of water.

Erosion: A process of breakdown and movement of land surface that is often intensified by human disturbances.

Eutrophic: A trophic state (degree of eutrophication) in which a lake or pond is nutrient rich and sustains high levels of biological productivity. Dense macrophyte growth, fast sediment accumulation, frequent algae blooms, poor water transparency and periodic oxygen depletion in the hypolimnion are common characteristics of eutrophic lakes and ponds.

Eutrophication: The process, or set of processes, driven by nutrient, organic matter, and sediment addition to a pond that leads to increased biological production and decreased volume. The process occurs naturally in all lakes and ponds over thousands of years.

Exotic Species: Species of plants or animals that occur outside of their normal, indigenous ranges and environments. Populations of exotic species may expand rapidly and displace native populations if natural predators, herbivores, or parasites are absent or if conditions are more favorable for the growth of the exotic species than for native species.

Filamentous: A term used to refer to a type of algae that forms long filaments composed of individual cells.

Groundwater: Water found beneath the soil surface and saturating the layer at which it is located.

Habitat: The natural dwelling place of an animal or plant; the type of environment where a particular species is likely to be found.

Herbicide: Any of a class of chemical compounds that produce mortality in plants when applied in sufficient concentrations.

Hypolimnion: In a thermally stratified lake, refers to the cooler, poorly-mixed lower layer of water.

Hypoxic: Lacking sufficient dissolved oxygen to support all but the most tolerant species.

Infiltration Structures: Any of a number of structures used to treat runoff quality or control runoff quantity by infiltrating runoff into the ground. Includes infiltration trenches, dry wells, infiltration basins, and leaching catch basins.

Invasive: Spreading aggressively from the original site of introduction.

Limnology: The study of lakes.

Littoral Zone: The shallow, highly productive area along the shoreline of a lake or pond where rooted aquatic plants grow.

Macroinvertebrates: Aquatic insects, worms, clams, snails and other animals visible without aid of a microscope. They supply a major portion of fish diets and are important consumers of detritus and algae.

Macrophytes: Macroscopic vascular plants present in the littoral zone of lakes and ponds.

Morphology: A term that refers to the depth contours and dimensions (topographic features) of a lake or pond.

Nutrient Limitation: The limitation of growth imposed by the depletion of an essential nutrient.

Nutrients: Elements or chemicals required to sustain life, including nitrogen and phosphorus.

pH: An index derived from the inverse log of the hydrogen ion concentration that ranges from 0 to 14 indicating the relative acidity or alkalinity of a liquid.

Photosynthesis: The process by which plants use chlorophyll to convert carbon dioxide, water and sunlight to oxygen and cellular products (carbohydrates).

Phytoplankton: Algae that are buoyant and freely suspended in the water.

Pollutants: Elements and compounds occurring naturally or man-made introduced into the environment at levels in excess of the concentration of chemicals naturally occurring.

Secchi disk: A black and white or all white 20 cm disk attached to a cord used to measure water transparency. The disk is lowered into the water until it is no longer visible (Secchi depth).

Secchi depth is generally proportional to the depth of light penetration sufficient to sustain algae growth.

Sediment: Topsoil, sand, minerals, and organic matter washed from the land into water, usually after rain or snowmelt. May also be generated by in-water production of organic matter (algae, plants, etc.).

Septic system: An individual wastewater treatment system that traditionally includes a septic tank for removing solids, and a leachfield for discharging the clarified wastewater to the ground.

Siltation: The process in which inorganic silt settles and accumulates at the bottom of a lake or pond.

Stormwater Runoff: Runoff generated as a result of precipitation or snowmelt.

Temperature Profile: A series of temperature measurements collected at incremental water depths from surface to bottom at a given location.

Thermal Stratification: The process by which a lake or pond forms several distinct thermal layers. The layers include a warmer well-mixed upper layer (epilimnion), a cooler, poorly mixed layer at the bottom (hypolimnion), and a middle layer (metalimnion) that separates the two.

TKN: Total Kjeldahl nitrogen, essentially the sum of ammonia nitrogen and organic forms of nitrogen.

TSS: Total suspended solids, a direct measure of all suspended solid materials in the water.

Turbidity: A measure of the light scattering properties of water; often used more generally to describe water clarity or the relative presence or absence of suspended materials in the water.

Vegetated Buffer: An undisturbed vegetated land area that separates an area of human activity from the adjacent water body; can be effective in reducing runoff velocities and volumes and the removal of sediment and pollutant from runoff.

Water Column: Water in a lake or pond between the interface with the atmosphere at the surface and the interface with the sediment at the bottom.

Water Quality: A term used to reference the general chemical and physical properties of water relative to the requirements of living organisms that depend upon that water.

Watershed: The surrounding land area that drains into a water body via surface runoff or groundwater recharge and discharge.

Zooplankton: Microscopic animals that float or are freely suspended in the water.

Appendix A: Laboratory Results

ANALYTICAL REPORT

Lab Number:	L2363677
Client:	TRC Companies, Inc. 10 Hemingway Dr. 2nd Fl East Providence, RI 02915
ATTN:	Jack Szczepanski
Phone:	(401) 330-1204
Project Name:	FREEMAN LAKE
Project Number:	557159.0000.0000
Report Date:	10/27/23

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0826), IL (200077), IN (C-MA-03), KY (KY98045), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), OH (CL108), OR (MA-1316), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #525-23-122-91930).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2363677
Report Date: 10/27/23

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2363677-01	STATION 1-SURFACE	WATER	CHELMSFORD, MA	10/26/23 10:15	10/26/23
L2363677-02	STATION 2-SURFACE	WATER	CHELMSFORD, MA	10/26/23 12:45	10/26/23

Project Name:	FREEMAN LAKE	**Lab Number:**	L2363677
Project Number:	557159.0000.0000	**Report Date:**	10/27/23

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Case Narrative (continued)

Sample Receipt

The samples were received at the laboratory above the required temperature range. The samples were delivered directly from the sampling site but were not on ice.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Tiffani Morrissey - Tiffani Morrissey

Title: Technical Director/Representative Date: 10/27/23

INORGANICS
&
MISCELLANEOUS

Project Name: FREEMAN LAKE **Lab Number:** L2363677
Project Number: 557159.0000.0000 **Report Date:** 10/27/23

SAMPLE RESULTS

Lab ID:	L2363677-01	Date Collected:	10/26/23 10:15
Client ID:	STATION 1-SURFACE	Date Received:	10/26/23
Sample Location:	CHELMSFORD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	15		col/100ml	2.0	NA	2	-	10/26/23 15:28	121,9222D	JAI

Project Name:	FREEMAN LAKE	**Lab Number:**	L2363677
Project Number:	557159.0000.0000	**Report Date:**	10/27/23

SAMPLE RESULTS

Lab ID:	L2363677-02	Date Collected:	10/26/23 12:45
Client ID:	STATION 2-SURFACE	Date Received:	10/26/23
Sample Location:	CHELMSFORD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	72		col/100ml	2.0	NA	2	-	10/26/23 15:28	121,9222D	JAI

Project Name: FREEMAN LAKE **Lab Number:** L2363677

Project Number: 557159.0000.0000 **Report Date:** 10/27/23

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab for sample(s): 01-02 Batch: WG1844733-1										
Coliform, Fecal (MF)	ND		col/100ml	1.0	NA	1	-	10/26/23 15:28	121,9222D	JAI

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2363677-01A	Bacteria Cup Na2S2O3 preserved	A	NA		23.6	Y	Absent		F-COLI-MF(.33)
L2363677-01B	Bacteria Cup Na2S2O3 preserved	A	NA		23.6	Y	Absent		F-COLI-MF(.33)
L2363677-02A	Bacteria Cup Na2S2O3 preserved	A	NA		23.6	Y	Absent		F-COLI-MF(.33)
L2363677-02B	Bacteria Cup Na2S2O3 preserved	A	NA		23.6	Y	Absent		F-COLI-MF(.33)

*Values in parentheses indicate holding time in days

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Report Format: *Data Usability Report*

Project Name: FREEMAN LAKE **Lab Number:** L2363677
Project Number: 557159.0000.0000 **Report Date:** 10/27/23

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625.1: alpha-Terpineol
EPA 8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 524.2: THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables).
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE ____ OF ____

ALPHA ANALYTICAL
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 10/26/23

ALPHA Job #: L2363677

Client Information

Client: TRC
Address: 10 Hemingway Drive
East Providence, RI 02915
Phone: 401 330 1223
Fax:
Email: jszczeparski@trccompanies.com

❑ These samples have been previously analyzed by Alpha

Project Information

Project Name: Freeman Lake
Project Location: Chelmsford, MA
Project #: 557159.0000.0000
Project Manager: Jack Szczeparski
ALPHA Quote #:

Turn-Around Time

☑ Standard ❑ RUSH (only confirmed if pre-approved!)

Date Due: Time:

Report Information - Data Deliverables

❑ FAX ☑ EMAIL
❑ ADEx ❑ Add'l Deliverables

Billing Information

❑ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program | Criteria

MA MCP PRESUMPTIVE CERTAINTY --- CT REASONABLE CONFIDENCE PROTO

❑ Yes ❑ No Are MCP Analytical Methods Required?
❑ Yes ❑ No Is Matrix Spike (MS) Required on this SDG? (If yes see note in Comments)
❑ Yes ❑ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:
If MS is required, indicate in Sample Specific Comments which samples and what tests MS to be performed.
(Note: All *CAM* methods for inorganic analyses require MS every 20 soil samples)

SAMPLE HANDLING
Filtration ________
❑ Done
❑ Not needed
❑ Lab to do
Preservation
❑ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS: Fecal Coliform											Sample Specific Comments	TOTAL # BOTTLES
63677-01	Station 1-Surface	10/26	1015	SW	SM	X												2
-02	Station 2-Surface	10/26	1245	SW	SM	X												2

PLEASE ANSWER QUESTIONS ABOVE!

S YOUR PROJECT
MA MCP or CT RCP?

Container Type
Preservative

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	10/26 1341	[signature]	10/26/23 1341

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 18-Jan-2010)

ANALYTICAL REPORT

Lab Number:	L2420748
Client:	TRC Companies, Inc. 10 Hemingway Dr. 2nd Fl East Providence, RI 02915
ATTN:	Jack Szczepanski
Phone:	(401) 330-1204
Project Name:	FREEMAN LAKE
Project Number:	557159.0000.0000
Report Date:	04/23/24

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0826), IL (200077), IN (C-MA-03), KY (KY98045), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), OR (MA-1316), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #525-23-122-91930A1).

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2420748
Report Date: 04/23/24

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2420748-01	STATION 1-SURFACE	WATER	CHELMSFORD, MA	04/16/24 10:00	04/16/24
L2420748-02	STATION 2	WATER	CHELMSFORD, MA	04/16/24 12:05	04/16/24

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Case Narrative (continued)

Sample Receipt

L2420748-02: The collection date/time was specified by the client.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Michelle M. Morris

Title: Technical Director/Representative Date: 04/23/24

INORGANICS
&
MISCELLANEOUS

Project Name: FREEMAN LAKE | **Lab Number:** L2420748

Project Number: 557159.0000.0000 | **Report Date:** 04/23/24

SAMPLE RESULTS

Lab ID:	L2420748-01	Date Collected:	04/16/24 10:00
Client ID:	STATION 1-SURFACE	Date Received:	04/16/24
Sample Location:	CHELMSFORD, MA	Field Prep:	Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	2.0		col/100ml	2.0	NA	2	-	04/16/24 16:52	121,9222D	JRG

Project Name:	FREEMAN LAKE	**Lab Number:**	L2420748
Project Number:	557159.0000.0000	**Report Date:**	04/23/24

SAMPLE RESULTS

Lab ID:	L2420748-02	Date Collected:	04/16/24 12:05
Client ID:	STATION 2	Date Received:	04/16/24
Sample Location:	CHELMSFORD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	10		col/100ml	2.0	NA	2	-	04/16/24 16:52	121,9222D	JRG

Project Name: FREEMAN LAKE **Lab Number:** L2420748
Project Number: 557159.0000.0000 **Report Date:** 04/23/24

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab for sample(s): 01-02 Batch: WG1909394-1										
Coliform, Fecal (MF)	ND		col/100ml	1.0	NA	1	-	04/16/24 16:52	121,9222D	JRG

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2420748
Report Date: 04/23/24

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2420748-01A	Bacteria Cup Na2S2O3 preserved	A	NA		4.1	Y	Absent		F-COLI-MF(.33)
L2420748-01B	Bacteria Cup Na2S2O3 preserved	A	NA		4.1	Y	Absent		F-COLI-MF(.33)
L2420748-02A	Bacteria Cup Na2S2O3 preserved	A	NA		4.1	Y	Absent		F-COLI-MF(.33)
L2420748-02B	Bacteria Cup Na2S2O3 preserved	A	NA		4.1	Y	Absent		F-COLI-MF(.33)

*Values in parentheses indicate holding time in days

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: *Data Usability Report*

Project Name: FREEMAN LAKE **Lab Number:** L2420748
Project Number: 557159.0000.0000 **Report Date:** 04/23/24

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Report Format: Data Usability Report

Project Name: FREEMAN LAKE **Lab Number:** L2420748
Project Number: 557159.0000.0000 **Report Date:** 04/23/24

Data Qualifiers

- **ND** - Not detected at the reporting limit (RL) for the sample.
- **NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- **P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- **Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- **R** - Analytical results are from sample re-analysis.
- **RE** - Analytical results are from sample re-extraction.
- **S** - Analytical results are from modified screening analysis.
- **V** - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)
- **Z** - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625.1: alpha-Terpineol
EPA 8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol, Azobenzene; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Nonpotable Water: EPA RSK-175 Dissolved Gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 524.2: THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables).
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE ____ OF ____

Date Rec'd in Lab: 4/16/24

ALPHA Job #: L2420748

ALPHA ANALYTICAL
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: TRC
Address: 10 Hemingway Drive
East Providence, RI 02915
Phone: 401-330-1223
Fax:
Email: Jszczepanski@trccompanies.com
☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Freeman Lake
Project Location: Chelmsford MA
Project #: 557159.0000.0000
Project Manager: Jack Szczepanski
ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☑ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:
PDF

Regulatory Requirements/Report Limits

State /Fed Program | Criteria

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS: Fecal Coliform

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Fecal Coliform	Sample Specific Comments	TOTAL # BOTTLES
20748-01	Station 1- Surface	4/16	1000	SW	SM	X		2
02	Station 2	4/16	0305	SW	SM	X		2

Container Type: P
Preservative:

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	4/16 2:36	[signature]	4/16/24 14:36

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

ANALYTICAL REPORT

Lab Number:	L2429838
Client:	TRC Companies, Inc. 10 Hemingway Dr. 2nd Fl East Providence, RI 02915
ATTN:	Jack Szczepanski
Phone:	(401) 330-1204
Project Name:	FREEMAN LAKE
Project Number:	557159.0000.0000
Report Date:	06/06/24

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0826), IL (200077), IN (C-MA-03), KY (KY98045), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), OR (MA-1316), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #525-23-122-91930A1).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2429838
Report Date: 06/06/24

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2429838-01	STATION 1-SURFACE	WATER	CHELMSFORD, MA	05/30/24 09:55	05/30/24
L2429838-02	STATION 2	WATER	CHELMSFORD, MA	05/30/24 11:40	05/30/24
L2429838-03	NORTH_SS_OUTFALL	WATER	CHELMSFORD, MA	05/30/24 07:35	05/30/24
L2429838-04	EAST_SS_OUTFALL	WATER	CHELMSFORD, MA	05/30/24 07:50	05/30/24
L2429838-05	NORTHWEST_SS_OUTFALL	WATER	CHELMSFORD, MA	05/30/24 08:25	05/30/24

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Case Narrative (continued)

Sample Receipt

L2429838-02: The collection date and time on the chain of custody was 30-MAY-24 11:40; however, the collection date/time on the container label was 30-MAY-24 12:40. At the client's request, the collection date/time is reported as 30-MAY-24 11:40.

Chlorophyll A

L2429838-01 and -02: The sample was analyzed with the method required holding time exceeded.

WG1927850: A Laboratory Duplicate was not performed due to a laboratory oversight.

Coliform, Fecal (MF)

L2429838-03: The result is estimated due to the elevated concentration in the sample. Due to the expiration of the method required holding time, re-analysis could not be performed.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Michelle M. Morris

Title: Technical Director/Representative Date: 06/06/24

INORGANICS
&
MISCELLANEOUS

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2429838
Report Date: 06/06/24

SAMPLE RESULTS

Lab ID: L2429838-01
Client ID: STATION 1-SURFACE
Sample Location: CHELMSFORD, MA

Date Collected: 05/30/24 09:55
Date Received: 05/30/24
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	5.0		col/100ml	2.0	NA	2	-	05/30/24 15:24	121,9222D	MEF
General Chemistry - Westborough Lab										
Chlorophyll A	19.3		mg/m3	2.00	NA	1	05/31/24 13:50	06/03/24 11:00	121,10200H	MKT

Project Name: FREEMAN LAKE
Lab Number: L2429838
Project Number: 557159.0000.0000
Report Date: 06/06/24

SAMPLE RESULTS

Lab ID: L2429838-02
Client ID: STATION 2
Sample Location: CHELMSFORD, MA
Date Collected: 05/30/24 11:40
Date Received: 05/30/24
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	7000		col/100ml	100	NA	100	-	05/30/24 15:24	121,9222D	MEF
General Chemistry - Westborough Lab										
Chlorophyll A	10.2		mg/m3	2.00	NA	1	05/31/24 13:50	06/03/24 11:00	121,10200H	MKT

Project Name: FREEMAN LAKE | **Lab Number:** L2429838
Project Number: 557159.0000.0000 | **Report Date:** 06/06/24

SAMPLE RESULTS

Lab ID: L2429838-03
Client ID: NORTH_SS_OUTFALL
Sample Location: CHELMSFORD, MA
Date Collected: 05/30/24 07:35
Date Received: 05/30/24
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	61000		col/100ml	100	NA	100	-	05/30/24 15:24	121,9222D	MEF

Project Name: FREEMAN LAKE | **Lab Number:** L2429838
Project Number: 557159.0000.0000 | **Report Date:** 06/06/24

SAMPLE RESULTS

Lab ID: L2429838-04
Client ID: EAST_SS_OUTFALL
Sample Location: CHELMSFORD, MA
Date Collected: 05/30/24 07:50
Date Received: 05/30/24
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	6700		col/100ml	100	NA	100	-	05/30/24 15:24	121,9222D	MEF

Project Name: FREEMAN LAKE | **Lab Number:** L2429838
Project Number: 557159.0000.0000 | **Report Date:** 06/06/24

SAMPLE RESULTS

Lab ID: L2429838-05 | Date Collected: 05/30/24 08:25
Client ID: NORTHWEST_SS_OUTFALL | Date Received: 05/30/24
Sample Location: CHELMSFORD, MA | Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	42		col/100ml	2.0	NA	2	-	05/30/24 15:24	121,9222D	MEF

Project Name: FREEMAN LAKE **Lab Number:** L2429838
Project Number: 557159.0000.0000 **Report Date:** 06/06/24

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab for sample(s): 01-05 Batch: WG1927714-1										
Coliform, Fecal (MF)	ND		col/100ml	1.0	NA	1	-	05/30/24 15:24	121,9222D	MEF
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1927850-1										
Chlorophyll A	ND		mg/m3	2.00	NA	1	05/31/24 13:50	06/03/24 11:00	121,10200H	MKT

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2429838-01A	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-01B	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-01C	Brown Plastic 1000ml unpreserved	A	NA		5.2	Y	Absent		CHLORO-A(1)
L2429838-01D	Brown Plastic 1000ml unpreserved	A	NA		5.2	Y	Absent		CHLORO-A(1)
L2429838-02A	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-02B	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-02C	Brown Plastic 1000ml unpreserved	A	NA		5.2	Y	Absent		CHLORO-A(1)
L2429838-02D	Brown Plastic 1000ml unpreserved	A	NA		5.2	Y	Absent		CHLORO-A(1)
L2429838-03A	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-03B	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-04A	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-04B	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-05A	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)
L2429838-05B	Bacteria Cup Na2S2O3 preserved	A	NA		5.2	Y	Absent		F-COLI-MF(.33)

*Values in parentheses indicate holding time in days

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name: FREEMAN LAKE **Lab Number:** L2429838
Project Number: 557159.0000.0000 **Report Date:** 06/06/24

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Report Format: *Data Usability Report*

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625.1: alpha-Terpineol
EPA 8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol, Azobenzene; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Nonpotable Water: EPA RSK-175 Dissolved Gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 524.2: THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables).
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE ____ OF ____

ALPHA ANALYTICAL
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 5/30/24

ALPHA Job #: L2429835

Client Information

Client: TRC
Address: 10 Hemingway Drive
East Providence, RI 02915
Phone: 401-330-1223
Fax:
Email: Jszczepanski@trccompanies.com

❑ These samples have been previously analyzed by Alpha

Project Information

Project Name: Freeman Lake
Project Location: Chelmsford MA
Project #: 557159.0000.0000
Project Manager: Jack Szczepanski
ALPHA Quote #:

Turn-Around Time

☑ Standard ❑ RUSH (only confirmed if pre-approved)

Date Due: Time:

Report Information - Data Deliverables

❑ FAX ❑ EMAIL
❑ ADEx ❑ Add'l Deliverables

Billing Information

❑ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program | Criteria

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS: Fecal coliform; Chlorophyll A

SAMPLE HANDLING
Filtration ____
❑ Done
❑ Not needed
❑ Lab to do
Preservation
❑ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Fecal coliform	Chlorophyll A	Sample Specific Comments	TOTAL # BOTTLES
29835-01	Station 1- Surface	5/30	~~0915~~ 0955	SW	SM	X	X		4
-02	Station 2	5/30	1140	SW	SM	X	X		4
-03	North_SS_Outfall	5/30	0735	SW	CO	X			2
-04	East_SS_outfall	5/30	0750	SW	CO	X			2
-05	Northwest_SS_outfall	5/30	0825	SW	CO	X			2

*Sample Time for Station 2 is ~~1130~~ 1140
-Station 1 0955

	Fecal coliform	Chlorophyll A
Container Type	P	P
Preservative		A

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	5/30 1250	[signature] PAS	5/30/24 1250

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

ANALYTICAL REPORT

Lab Number:	L2436144
Client:	TRC Companies, Inc. 10 Hemingway Dr. 2nd Fl East Providence, RI 02915
ATTN:	Jack Szczepanski
Phone:	(401) 330-1204
Project Name:	FREEMAN LAKE
Project Number:	557159.0000.0000
Report Date:	07/03/24

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0826), IL (200077), IN (C-MA-03), KY (KY98045), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), OR (MA-1316), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #525-23-122-91930A1).

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2436144
Report Date: 07/03/24

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2436144-01	STATION 1-SURFACE	WATER	CHELMSFORD, MA	06/26/24 10:05	06/26/24
L2436144-02	STATION 2	WATER	CHELMSFORD, MA	06/26/24 11:40	06/26/24

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	FREEMAN LAKE	**Lab Number:**	L2436144
Project Number:	557159.0000.0000	**Report Date:**	07/03/24

Case Narrative (continued)

E. Coli (MF)

L2436144-01: The sample has an elevated detection limit due to the dilution required by the method.

Coliform, Fecal (MF)

L2436144-01: The sample has an elevated detection limit due to the dilution required by the method.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Tiffani Morrissey - Tiffani Morrissey

Title: Technical Director/Representative

Date: 07/03/24

INORGANICS
&
MISCELLANEOUS

Project Name: FREEMAN LAKE

Project Number: 557159.0000.0000

Lab Number: L2436144

Report Date: 07/03/24

SAMPLE RESULTS

Lab ID: L2436144-01
Client ID: STATION 1-SURFACE
Sample Location: CHELMSFORD, MA

Date Collected: 06/26/24 10:05
Date Received: 06/26/24
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	ND		col/100ml	2.0	NA	2	-	06/26/24 16:00	121,9222D	JRG
E. Coli (MF)	ND		col/100ml	2.0	NA	2	-	06/26/24 17:44	121,9213D	JRG
General Chemistry - Westborough Lab										
Chlorophyll A	4.06		mg/m3	2.00	NA	1	06/27/24 09:20	06/28/24 09:40	121,10200H	MKT

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2436144
Report Date: 07/03/24

SAMPLE RESULTS

Lab ID: L2436144-02
Client ID: STATION 2
Sample Location: CHELMSFORD, MA

Date Collected: 06/26/24 11:40
Date Received: 06/26/24
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	330		col/100ml	10	NA	10	-	06/26/24 16:00	121,9222D	JRG
E. Coli (MF)	280		col/100ml	10	NA	10	-	06/26/24 17:44	121,9213D	JRG
General Chemistry - Westborough Lab										
Chlorophyll A	ND		mg/m3	2.00	NA	1	06/27/24 09:20	06/28/24 09:40	121,10200H	MKT

Project Name: FREEMAN LAKE **Lab Number:** L2436144
Project Number: 557159.0000.0000 **Report Date:** 07/03/24

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab for sample(s): 01-02 Batch: WG1939788-1										
E. Coli (MF)	ND		col/100ml	1.0	NA	1	-	06/26/24 17:44	121,9213D	JRG
Microbiological Analysis - Westborough Lab for sample(s): 01-02 Batch: WG1939792-1										
Coliform, Fecal (MF)	ND		col/100ml	1.0	NA	1	-	06/26/24 16:00	121,9222D	JRG
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1940246-1										
Chlorophyll A	ND		mg/m3	2.00	NA	1	06/27/24 09:20	06/28/24 09:40	121,10200H	MKT

Lab Duplicate Analysis
Batch Quality Control

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2436144
Report Date: 07/03/24

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1940246-2 QC Sample: L2436144-02 Client ID: STATION 2						
Chlorophyll A	ND	ND	mg/m3	NC		35

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2436144
Report Date: 07/03/24

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2436144-01A	Bacteria Cup Na2S2O3 preserved	A	NA		5.3	Y	Absent		F-COLI-MF(.33)
L2436144-01B	Bacteria Cup Na2S2O3 preserved	A	NA		5.3	Y	Absent		F-COLI-MF(.33)
L2436144-01C	Bacteria Cup Na2S2O3 preserved	A	NA		5.3	Y	Absent		E-COLI-MF(.33)
L2436144-01D	Bacteria Cup Na2S2O3 preserved	A	NA		5.3	Y	Absent		E-COLI-MF(.33)
L2436144-01E	Brown Plastic 1000ml unpreserved	A	NA		5.3	Y	Absent		CHLORO-A(1)
L2436144-01F	Brown Plastic 1000ml unpreserved	A	NA		5.3	Y	Absent		CHLORO-A(1)
L2436144-02A	Bacteria Cup Na2S2O3 preserved	A	NA		5.3	Y	Absent		F-COLI-MF(.33)
L2436144-02B	Bacteria Cup Na2S2O3 preserved	A	NA		5.3	Y	Absent		F-COLI-MF(.33)
L2436144-02C	Bacteria Cup Na2S2O3 preserved	A	NA		5.3	Y	Absent		E-COLI-MF(.33)
L2436144-02D	Bacteria Cup Na2S2O3 preserved	A	NA		5.3	Y	Absent		E-COLI-MF(.33)
L2436144-02E	Brown Plastic 1000ml unpreserved	A	NA		5.3	Y	Absent		CHLORO-A(1)
L2436144-02F	Brown Plastic 1000ml unpreserved	A	NA		5.3	Y	Absent		CHLORO-A(1)

*Values in parentheses indicate holding time in days

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Project Name: FREEMAN LAKE **Lab Number:** L2436144
Project Number: 557159.0000.0000 **Report Date:** 07/03/24

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625.1: alpha-Terpineol
EPA 8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol, Azobenzene; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Nonpotable Water: EPA RSK-175 Dissolved Gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 524.2: THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables).
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE ____ OF ____

ALPHA ANALYTICAL
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 6/26/24

ALPHA Job #: L2436144

Client Information

Client: TRC
Address: 10 Hemingway Drive
East Providence, RI 02915
Phone: 401-330-1223
Fax:
Email: Jszczepanski@trccompanies.com
☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Freeman Lake
Project Location: Chelmsford MA
Project #: 557159.0000.0000
Project Manager: Jack Szczepanski
ALPHA Quote #:

Turn-Around Time

☐ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☑ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☑ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program | Criteria

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS: Fecal Coliform, E. coli, Chlorophyll A

SAMPLE HANDLING
Filtration ________
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Fecal Coliform	E. coli	Chlorophyll A	Sample Specific Comments	TOTAL # BOTTLES
36144-01	Station 1- Surface	6/26	1005	SW	SM	X	X	X		6
-02	Station 2	6/26	1140	SW	SM	X	X	X		6

Container Type: P
Preservative:

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	6/26 1313	[signature]	6/26/24 13:13

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

ANALYTICAL REPORT

Lab Number:	L2444846
Client:	TRC Companies, Inc. 10 Hemingway Dr. 2nd Fl East Providence, RI 02915
ATTN:	Jack Szczepanski
Phone:	(401) 330-1204
Project Name:	FREEMAN LAKE
Project Number:	557159.0000.0000
Report Date:	08/15/24

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0826), IL (200077), IN (C-MA-03), KY (KY98045), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), OR (MA-1316), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #525-23-122-91930A1).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name:	FREEMAN LAKE	**Lab Number:**	L2444846
Project Number:	557159.0000.0000	**Report Date:**	08/15/24

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2444846-01	STATION 1	WATER	CHELMSFORD, MA	08/08/24 09:40	08/08/24
L2444846-02	STATION 2	WATER	CHELMSFORD, MA	08/08/24 11:15	08/08/24

Project Name:	FREEMAN LAKE	**Lab Number:**	L2444846
Project Number:	557159.0000.0000	**Report Date:**	08/15/24

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments and solids are reported on a dry weight basis unless otherwise noted. Tissues are reported "as received" or on a wet weight basis, unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Melissa Sturgis Melissa Sturgis

Title: Technical Director/Representative Date: 08/15/24

ALPHA ANALYTICAL

INORGANICS
&
MISCELLANEOUS

Project Name: FREEMAN LAKE **Lab Number:** L2444846
Project Number: 557159.0000.0000 **Report Date:** 08/15/24

SAMPLE RESULTS

Lab ID:	L2444846-01	Date Collected:	08/08/24 09:40
Client ID:	STATION 1	Date Received:	08/08/24
Sample Location:	CHELMSFORD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	2.0		col/100ml	2.0	NA	2	-	08/08/24 15:39	121,9222D	MAW
E. Coli (MF)	7.0		col/100ml	2.0	NA	2	-	08/08/24 16:36	121,9213D	MAW
General Chemistry - Westborough Lab										
Chlorophyll A	8.80		mg/m3	2.00	NA	1	08/09/24 01:40	08/12/24 09:10	121,10200H	MKT

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2444846
Report Date: 08/15/24

SAMPLE RESULTS

Lab ID: L2444846-02
Client ID: STATION 2
Sample Location: CHELMSFORD, MA

Date Collected: 08/08/24 11:15
Date Received: 08/08/24
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	210		col/100ml	2.0	NA	2	-	08/08/24 15:39	121,9222D	MAW
E. Coli (MF)	160		col/100ml	2.0	NA	2	-	08/08/24 16:36	121,9213D	MAW
General Chemistry - Westborough Lab										
Chlorophyll A	ND		mg/m3	2.00	NA	1	08/09/24 01:40	08/12/24 09:10	121,10200H	MKT

Project Name: FREEMAN LAKE
Lab Number: L2444846
Project Number: 557159.0000.0000
Report Date: 08/15/24

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab for sample(s): 01-02 Batch: WG1957040-1										
Coliform, Fecal (MF)	ND		col/100ml	1.0	NA	1	-	08/08/24 15:39	121,9222D	MAW
Microbiological Analysis - Westborough Lab for sample(s): 01-02 Batch: WG1957055-1										
E. Coli (MF)	ND		col/100ml	1.0	NA	1	-	08/08/24 16:36	121,9213D	MAW
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1957183-1										
Chlorophyll A	ND		mg/m3	2.00	NA	1	08/09/24 01:40	08/12/24 09:10	121,10200H	MKT

Lab Duplicate Analysis
Batch Quality Control

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2444846
Report Date: 08/15/24

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1957183-2 QC Sample: L2444846-01 Client ID: STATION 1						
Chlorophyll A	8.80	9.84	mg/m3	11		35

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2444846-01A	Bacteria Cup Na2S2O3 preserved	A	NA		3.0	Y	Absent		F-COLI-MF(.33)
L2444846-01B	Bacteria Cup Na2S2O3 preserved	A	NA		3.0	Y	Absent		F-COLI-MF(.33)
L2444846-01C	Bacteria Cup Na2S2O3 preserved	A	NA		3.0	Y	Absent		E-COLI-MF(.33)
L2444846-01D	Bacteria Cup Na2S2O3 preserved	A	NA		3.0	Y	Absent		E-COLI-MF(.33)
L2444846-01E	Brown Plastic 1000ml unpreserved	A	NA		3.0	Y	Absent		CHLORO-A(1)
L2444846-01F	Brown Plastic 1000ml unpreserved	A	NA		3.0	Y	Absent		CHLORO-A(1)
L2444846-02A	Bacteria Cup Na2S2O3 preserved	A	NA		3.0	Y	Absent		F-COLI-MF(.33)
L2444846-02B	Bacteria Cup Na2S2O3 preserved	A	NA		3.0	Y	Absent		F-COLI-MF(.33)
L2444846-02C	Bacteria Cup Na2S2O3 preserved	A	NA		3.0	Y	Absent		E-COLI-MF(.33)
L2444846-02D	Bacteria Cup Na2S2O3 preserved	A	NA		3.0	Y	Absent		E-COLI-MF(.33)
L2444846-02E	Brown Plastic 1000ml unpreserved	A	NA		3.0	Y	Absent		CHLORO-A(1)
L2444846-02F	Brown Plastic 1000ml unpreserved	A	NA		3.0	Y	Absent		CHLORO-A(1)

*Values in parentheses indicate holding time in days

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name: FREEMAN LAKE **Lab Number:** L2444846
Project Number: 557159.0000.0000 **Report Date:** 08/15/24

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Report Format: Data Usability Report

Project Name: FREEMAN LAKE **Lab Number:** L2444846
Project Number: 557159.0000.0000 **Report Date:** 08/15/24

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625.1: alpha-Terpineol
EPA 8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol, Azobenzene; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Nonpotable Water: EPA RSK-175 Dissolved Gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 524.2: THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables).
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Serial_No:08152410:35

L2444846 15AUG24
ESS – RI

CHAIN OF CUSTODY

PAGE ____ OF ____

ALPHA ANALYTICAL

8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 8/8/24

Project Information

Project Name: Freeman Lake
Project Location: Chelmsford, MA
Project #: 557159.0000.0000
Project Manager: Jack Szczepanski
ALPHA Quote #:

Report Information - Data Deliverables

☐ ADEx ☐ EMAIL ☐ Same as Client info PO #:

Client Information

Client: TRC
Address: 10 Hemingway Drive East Providence RI 02915
Phone: 401-330-1223
Email: jszczepanski@trccompanies.com

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program ____ Criteria ____

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Additional Project Information:

ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint; Fecal Coliform; E. coli; Chlorophyll A

SAMPLE INFO: Filtration ☐ Field ☐ Lab to do; Preservation ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	Fecal Coliform	E. coli	Chlorophyll A	Sample Comments	TOTAL # BOTTLES
44846-01	Station 1	8/8	0940	SW	SM	X	X	X		6
02	Station 2	8/8	1115	SW	SM	X	X	X		6

Container Type
Preservative

Container Type: P= Plastic, A= Amber glass, V= Vial, G= Glass, B= Bacteria cup, C= Cube, O= Other, E= Encore, D= BOD Bottle

Preservative: A= None, B= HCl, C= HNO_3, D= H_2SO_4, E= NaOH, F= MeOH, G= $NaHSO_4$, H = $Na_2S_2O_3$, I= Ascorbic Acid, J = NH_4Cl, K= Zn Acetate, O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	8/8 1239	[signature]	8/8/24 12:39

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L2456877
Client:	TRC Companies, Inc. 10 Hemingway Dr. 2nd Fl East Providence, RI 02915
ATTN:	Matt Ladewig
Phone:	(401) 330-1204
Project Name:	FREEMAN LAKE
Project Number:	557159.0000.0000
Report Date:	10/09/24

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0826), IL (200077), IN (C-MA-03), KY (KY98045), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), OR (MA-1316), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #525-23-122-91930A1).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2456877
Report Date: 10/09/24

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2456877-01	STATION 1	WATER	CHELMSFORD, MA	10/02/24 09:15	10/02/24
L2456877-02	STATION 2	WATER	CHELMSFORD, MA	10/02/24 10:40	10/02/24

Project Name:	FREEMAN LAKE	**Lab Number:**	L2456877
Project Number:	557159.0000.0000	**Report Date:**	10/09/24

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments and solids are reported on a dry weight basis unless otherwise noted. Tissues are reported "as received" or on a wet weight basis, unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2456877
Report Date: 10/09/24

Case Narrative (continued)

Sample Receipt

The samples were received at the laboratory above the required temperature range and were not on ice.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Caitlin Walukevich Caitlin Walukevich

Title: Technical Director/Representative

Date: 10/09/24

INORGANICS
&
MISCELLANEOUS

Project Name: FREEMAN LAKE
Lab Number: L2456877
Project Number: 557159.0000.0000
Report Date: 10/09/24

SAMPLE RESULTS

Lab ID: L2456877-01
Date Collected: 10/02/24 09:15
Client ID: STATION 1
Date Received: 10/02/24
Sample Location: CHELMSFORD, MA
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	25		col/100ml	2.0	NA	2	-	10/02/24 16:28	121,9222D	MAW
E. Coli (MF)	25		col/100ml	2.0	NA	2	-	10/02/24 16:28	121,9213D	MAW
General Chemistry - Westborough Lab										
Chlorophyll A	11.7		mg/m3	2.00	NA	1	10/02/24 14:20	10/04/24 08:15	121,10200H	MKT

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2456877
Report Date: 10/09/24

SAMPLE RESULTS

Lab ID: L2456877-02
Client ID: STATION 2
Sample Location: CHELMSFORD, MA

Date Collected: 10/02/24 10:40
Date Received: 10/02/24
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Microbiological Analysis - Westborough Lab										
Coliform, Fecal (MF)	100		col/100ml	2.0	NA	2	-	10/02/24 16:28	121,9222D	MAW
E. Coli (MF)	130		col/100ml	2.0	NA	2	-	10/02/24 16:28	121,9213D	MAW
General Chemistry - Westborough Lab										
Chlorophyll A	4.32		mg/m3	2.00	NA	1	10/02/24 14:20	10/04/24 08:15	121,10200H	MKT

Project Name: FREEMAN LAKE
Lab Number: L2456877
Project Number: 557159.0000.0000
Report Date: 10/09/24

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1979253-1										
Chlorophyll A	ND		mg/m3	2.00	NA	1	10/02/24 14:20	10/04/24 08:15	121,10200H	MKT
Microbiological Analysis - Westborough Lab for sample(s): 01-02 Batch: WG1979280-1										
E. Coli (MF)	ND		col/100ml	1.0	NA	1	-	10/02/24 16:28	121,9213D	MAW
Microbiological Analysis - Westborough Lab for sample(s): 01-02 Batch: WG1979282-1										
Coliform, Fecal (MF)	ND		col/100ml	1.0	NA	1	-	10/02/24 16:28	121,9222D	MAW

Lab Duplicate Analysis

Batch Quality Control

Project Name: FREEMAN LAKE

Project Number: 557159.0000.0000

Lab Number: L2456877

Report Date: 10/09/24

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1979253-2 QC Sample: L2456877-02 Client ID: STATION 2						
Chlorophyll A	4.32	ND	mg/m3	NC		35

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2456877
Report Date: 10/09/24

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2456877-01A	Bacteria Cup Na2S2O3 preserved	A	NA		17.0	Y	Absent		F-COLI-MF(.33)
L2456877-01B	Bacteria Cup Na2S2O3 preserved	A	NA		17.0	Y	Absent		F-COLI-MF(.33)
L2456877-01C	Bacteria Cup Na2S2O3 preserved	A	NA		17.0	Y	Absent		E-COLI-MF(.33)
L2456877-01D	Bacteria Cup Na2S2O3 preserved	A	NA		17.0	Y	Absent		E-COLI-MF(.33)
L2456877-01E	Brown Plastic 1000ml unpreserved	A	NA		17.0	Y	Absent		CHLORO-A(1)
L2456877-01F	Brown Plastic 1000ml unpreserved	A	NA		17.0	Y	Absent		CHLORO-A(1)
L2456877-02A	Bacteria Cup Na2S2O3 preserved	A	NA		17.0	Y	Absent		F-COLI-MF(.33)
L2456877-02B	Bacteria Cup Na2S2O3 preserved	A	NA		17.0	Y	Absent		F-COLI-MF(.33)
L2456877-02C	Bacteria Cup Na2S2O3 preserved	A	NA		17.0	Y	Absent		E-COLI-MF(.33)
L2456877-02D	Bacteria Cup Na2S2O3 preserved	A	NA		17.0	Y	Absent		E-COLI-MF(.33)
L2456877-02E	Brown Plastic 1000ml unpreserved	A	NA		17.0	Y	Absent		CHLORO-A(1)
L2456877-02F	Brown Plastic 1000ml unpreserved	A	NA		17.0	Y	Absent		CHLORO-A(1)

*Values in parentheses indicate holding time in days

Project Name: FREEMAN LAKE **Lab Number:** L2456877
Project Number: 557159.0000.0000 **Report Date:** 10/09/24

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Project Name:	FREEMAN LAKE	**Lab Number:**	L2456877
Project Number:	557159.0000.0000	**Report Date:**	10/09/24

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Project Name: FREEMAN LAKE **Lab Number:** L2456877
Project Number: 557159.0000.0000 **Report Date:** 10/09/24

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625.1: alpha-Terpineol
EPA 8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol, Azobenzene; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Nonpotable Water: EPA RSK-175 Dissolved Gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 524.2: THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables).
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

L2456877 09OCT24
ESS – RI

CHAIN OF CUSTODY

PAGE ____ OF ____

Date Rec'd in Lab: 10/02/24

ALPHA
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: TRC
Address: 10 Hemingway Drive
East Providence, RI 02915
Phone:
Email: mladewig@trccompanies.com

Additional Project Information:

Project Information

Project Name: Freeman Lake
Project Location: Chelmsford, MA
Project #: 557159.0000.0000
Project Manager: Matt Ladewig
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)

Date Due:

Report Information - Data Deliverables

☐ ADEx ☐ EMAIL ☐ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program ________ Criteria ________

ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint

SAMPLE INFO
Filtration ☐ Field ☐ Lab to do
Preservation ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	Chlorophyll a	e-coli	fecal coliform	Sample Comments	TOTAL # BOTTLES
56877-01	Station 1	10/2	0915	SW	SM	X	X	X		6
02	Station 2	10/2	1040	SW	SM	X	X	X		6

Container Type
Preservative

Container Type	Preservative
P= Plastic	A= None
A= Amber glass	B= HCl
V= Vial	C= HNO_3
G= Glass	D= H_2SO_4
B= Bacteria cup	E= NaOH
C= Cube	F= MeOH
O= Other	G= $NaHSO_4$
E= Encore	H = $Na_2S_2O_3$
D= BOD Bottle	I= Ascorbic Acid
	J = NH_4Cl
	K= Zn Acetate
	O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	10/2/24 1154	C Colbeau	10/2/24 1154

Friday, November 10, 2023

Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: FREEMAN LAKE
SDG ID: GCP35678
Sample ID#s: CP35678 - CP35680

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Telephone (860) 645-1102

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

November 10, 2023

SDG I.D.: GCP35678

Project ID: FREEMAN LAKE

Client Id	Lab Id	Matrix
STATION 1-SURFACE	CP35678	SURFACE WATER
STATION 1-BOTTOM	CP35679	SURFACE WATER
STATION 2	CP35680	SURFACE WATER

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

November 10, 2023

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		10/26/23	10:15
Location Code:	TRC-RI	Received by:	CP	10/27/23	16:55
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	557159.0000.0000				

Laboratory Data

SDG ID: GCP35678
Phoenix ID: CP35678

Project ID: FREEMAN LAKE
Client ID: STATION 1-SURFACE

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	32	20.0	mg/L	1	10/28/23	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.13	0.05	mg/L	1	11/09/23	KDB	E350.1
Nitrite-N	< 0.010	0.010	mg/L	1	10/27/23 22:12	ER	E353.2
Nitrate-N	0.14	0.02	mg/L	1	10/27/23 22:12	ER	E353.2
Nitrogen Tot Kjeldahl	0.44	0.10	mg/L	1	11/09/23	KDB	E351.1
Phosphorus, as P	0.022	0.003	mg/L	0.5	10/30/23	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Phyllis Shiller, Laboratory Director
November 10, 2023
Reviewed and Released by: Anil Makol, Project Manager

Ver 1

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

November 10, 2023

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		10/26/23	10:30
Location Code:	TRC-RI	Received by:	CP	10/27/23	16:55
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	557159.0000.0000				

Laboratory Data

SDG ID: GCP35678
Phoenix ID: CP35679

Project ID: FREEMAN LAKE
Client ID: STATION 1-BOTTOM

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	33	20.0	mg/L	1	10/28/23	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.19	0.05	mg/L	1	11/09/23	KDB	E350.1
Nitrite-N	< 0.010	0.010	mg/L	1	10/27/23 22:15	ER	E353.2
Nitrate-N	0.16	0.02	mg/L	1	10/27/23 22:15	ER	E353.2
Nitrogen Tot Kjeldahl	0.59	0.10	mg/L	1	11/09/23	KDB	E351.1
Phosphorus, as P	0.030	0.003	mg/L	0.5	10/30/23	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
November 10, 2023
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

November 10, 2023

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		10/26/23	12:45
Location Code:	TRC-RI	Received by:	CP	10/27/23	16:55
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	557159.0000.0000				

Laboratory Data

SDG ID: GCP35678
Phoenix ID: CP35680

Project ID: FREEMAN LAKE
Client ID: STATION 2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	33	20.0	mg/L	1	10/28/23	MW/KDB	SM2320B-11
Ammonia as Nitrogen	< 0.05	0.05	mg/L	1	11/09/23	KDB	E350.1
Nitrite-N	< 0.010	0.010	mg/L	1	10/27/23 22:33	ER	E353.2
Nitrate-N	0.16	0.02	mg/L	1	10/27/23 22:33	ER	E353.2
Nitrogen Tot Kjeldahl	0.54	0.10	mg/L	1	11/09/23	KDB	E351.1
Phosphorus, as P	0.025	0.003	mg/L	0.5	10/30/23	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
November 10, 2023
Reviewed and Released by: Anil Makol, Project Manager

Ver 1

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

November 10, 2023

QA/QC Data

SDG I.D.: GCP35678

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 704020 (mg/L), QC Sample No: CP35633 (CP35678, CP35679, CP35680)													
Alkalinity-CaCO3	BRL	5.00	22	22	NC	95.9						85 - 115	20
QA/QC Batch 704090 (mg/L), QC Sample No: CP35829 (CP35678, CP35679, CP35680)													
Phosphorus, as P	BRL	0.01	112	107	4.60	99.2			NC			85 - 115	20
Comment:													
Additional criteria matrix spike acceptance range is 75-125%.													
QA/QC Batch 703988 (mg/L), QC Sample No: CP35678 (CP35678, CP35679, CP35680)													
Nitrate-N	BRL	0.02	0.14	0.14	0	101			102			90 - 110	20
Nitrite-N	BRL	0.01	<0.010	<0.01	NC	94.0			103			90 - 110	20
QA/QC Batch 705475 (mg/L), QC Sample No: CP35263 (CP35678, CP35679, CP35680)													
Ammonia as Nitrogen	BRL	0.05	0.08	0.14	NC	104			106			90 - 110	20
Nitrogen Tot Kjeldahl	BRL	0.10	0.39	0.48	NC	97.2			100			85 - 115	20
Comment:													
TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
November 10, 2023

Criteria: None

State: CT

Sample Criteria Exceedances Report

GCP35678 - TRC-RI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Comments

November 10, 2023 SDG I.D.: GCP35678

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes ☑ No ☐
Coolant: IPK ☑ ICE ☑ No ☐

Temp 0 °C Pg of

PHOENIX
Environmental Laboratories, Inc.

CT/MA/RI CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Data Delivery/Contact Options:
- ☐ Fax:
- ☐ Phone:
- ☑ Email: jszczepanski@trccompanies.com

Customer: TRC
Address: 10 Hemingway Drive
East Providence, RI 02915

Project: Freeman Lake
Report to: jszczepanski@trccompanies.com
Invoice to: ncabral@trccompanies.com
Quote # 557159.0000.0000

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature ____________ Date: ________

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = ________(Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	Total Phosphorus, Total Kjeldahl N	~~[illegible]~~ Nitrate, Nitrite	Ammonia	Alkalinity	GL Amber 8 oz. [ ] w/H3PO4 [ ] NAHSO4	Soil VOA Vials [ ] methanol [ ] H2O	GL Soil container ( ) oz	GL Soil container ( ) oz	40 ml VOA Vial	GL Amber 1000ml [ ] As is [ ] HCl	PL As is [✓] 250ml [ ] 500ml [ ] 1000ml	PL H_2SO_4 [✓] 250ml [ ] 500ml	PL HNO_3 250ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is
35678	Station 1-Surface	SW	10/26	1015		x	x	x	x							1	2				
35679	Station 1-Bottom	SW	10/26	1030		x	x	x	x							1	2				
35680	Station 2	SW	10/26	1295		x	x	x	x							1	2				

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	10-27-23	1210
[signature]	[signature]	10/27/23	16:55

Comments, Special Requirements or Regulations:

Turnaround Time:
- ☐ 1 Day*
- ☐ 2 Days*
- ☐ 3 Days*
- ☐ 4 Days*
- ☐ 5 Days*
- ☑ Standard
- ☐ Other

* SURCHARGES MAY APPLY

RI
- ☐ RES DEC
- ☐ I/C DEC
- ☐ GA Leachability
- ☐ GB Leachability
- ☐ GA-GW Objectives
- ☐ GB-GW Objectives
- ☐ Other

CT
- ☐ RCP Cert
- ☐ GWPC
- ☐ SWPC
- ☐ GA PMC
- ☐ GB PMC
- ☐ SWPC
- ☐ RES DEC
- ☐ I/C DEC

MA
- ☐ MCP Certification
- ☐ GW-1
- ☐ GW-2
- ☐ GW-3
- ☐ S-1
- ☐ S-2
- ☐ S-3
- ☐ SW Protection
- ☐ RCS-1 / RCGW-1
- ☐ RCS-2 / RCGW-2
- ☐ ________

State where samples were collected: MA

Data Format
- ☑ Excel
- ☑ PDF
- ☐ GIS/Key
- ☐ EQuIS
- ☐ Other

Data Package
- ☐ Tier II Checklist*
- ☐ Full Data Package*
- ☑ Phoenix Std
- ☐ Other

* SURCHARGE APPLIES

**MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.*

Monday, April 29, 2024

Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: 557159.0000.0000
SDG ID: GCQ53545
Sample ID#s: CQ53545 - CQ53547

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

April 29, 2024

SDG I.D.: GCQ53545

Project ID: 557159.0000.0000

Client Id	Lab Id	Matrix
STATION 1-SURFACE	CQ53545	SURFACE WATER
STATION 1-BOTTOM	CQ53546	SURFACE WATER
STATION 2	CQ53547	SURFACE WATER

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 29, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		04/16/24	10:00
Location Code:	TRC-RI	Received by:	CP	04/17/24	15:12
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ53545
Phoenix ID: CQ53545

Project ID: 557159.0000.0000
Client ID: STATION 1-SURFACE

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	25	20.0	mg/L	1	04/19/24	MW	SM2320B-11
Ammonia as Nitrogen	< 0.05	0.05	mg/L	1	04/27/24	KDB	E350.1
Nitrate-N	0.23	0.02	mg/L	1	04/17/24 21:31	ER	E353.2
Nitrogen Tot Kjeldahl	0.22	0.10	mg/L	1	04/27/24	KDB	E351.1
Phosphorus, as P	0.018	0.003	mg/L	0.5	04/18/24	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
April 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

Ver 1

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 29, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		04/16/24	10:15
Location Code:	TRC-RI	Received by:	CP	04/17/24	15:12
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ53545
Phoenix ID: CQ53546

Project ID: 557159.0000.0000
Client ID: STATION 1-BOTTOM

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	24	20.0	mg/L	1	04/19/24	MW	SM2320B-11
Ammonia as Nitrogen	0.07	0.05	mg/L	1	04/27/24	KDB	E350.1
Nitrate-N	0.27	0.02	mg/L	1	04/17/24 21:33	ER	E353.2
Nitrogen Tot Kjeldahl	0.67	0.10	mg/L	1	04/27/24	KDB	E351.1
Phosphorus, as P	0.049	0.003	mg/L	0.5	04/18/24	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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Phyllis Shiller

Phyllis Shiller, Laboratory Director
April 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

Ver 1

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 29, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		04/16/24	3:05
Location Code:	TRC-RI	Received by:	CP	04/17/24	15:12
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ53545
Phoenix ID: CQ53547

Project ID: 557159.0000.0000
Client ID: STATION 2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	26	20.0	mg/L	1	04/19/24	MW	SM2320B-11
Ammonia as Nitrogen	0.08	0.05	mg/L	1	04/27/24	KDB	E350.1
Nitrate-N	0.20	0.02	mg/L	1	04/17/24 21:34	ER	E353.2
Nitrogen Tot Kjeldahl	0.48	0.10	mg/L	1	04/27/24	KDB	E351.1
Phosphorus, as P	0.024	0.003	mg/L	0.5	04/18/24	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
April 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

April 29, 2024

QA/QC Data

SDG I.D.: GCQ53545

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 727499 (mg/L), QC Sample No: CQ49732 (CQ53545, CQ53546, CQ53547)													
Phosphorus, as P	BRL	0.01	2.32	2.39	3.00	97.2			102			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 727770 (mg/L), QC Sample No: CQ54383 (CQ53545, CQ53546, CQ53547)													
Alkalinity-CaCO3	BRL	5.00	51	50	NC	106						85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 727373 (mg/L), QC Sample No: CQ53435 (CQ53545, CQ53546, CQ53547)													
Nitrate-N	BRL	0.02	0.16	0.16	0	103			99.7			90 - 110	20
QA/QC Batch 728704 (mg/L), QC Sample No: CQ53437 (CQ53545, CQ53546, CQ53547)													
Ammonia as Nitrogen	BRL	0.05	0.05	0.05	NC	104			101			90 - 110	20
Nitrogen Tot Kjeldahl	BRL	0.10	0.77	0.76	1.30	97.7			93.1			85 - 115	20
Comment:													
TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

- RPD - Relative Percent Difference
- LCS - Laboratory Control Sample
- LCSD - Laboratory Control Sample Duplicate
- MS - Matrix Spike
- MS Dup - Matrix Spike Duplicate
- NC - No Criteria
- Intf - Interference

Phyllis Shiller

Phyllis Shiller, Laboratory Director
April 29, 2024

Criteria: None

State: MA

Sample Criteria Exceedances Report

GCQ53545 - TRC-RI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

April 29, 2024 SDG I.D.: GCQ53545

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes ☑ No ☐
Coolant: IPK ☑ ICE ☐ No ☐

CT/MA/RI CHAIN OF CUSTODY RECORD

PHOENIX *Environmental Laboratories, Inc.*

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp 1.5 °C Pg of

Data Delivery/Contact Options:
- ☐ Fax:
- ☐ Phone:
- ☐ Email: Jszczepanski@trccompanies.com

Customer:	TRC Environmental Corporation	Project:	557159.0000.0000
Address:	10 Hemingway Drive	Report to:	Jszczepanski@trccompanies.com
	East Providence, RI 02915	Invoice to:	
		Quote #	

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: [signature] Date: 4/16

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = ____________(Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	Total Phosphorus	TKN	Nitrate-Nitrogen	Ammonia Nitrogen	Alkalinity	GL Amber 8 oz. [ ] w/H_3PO_4 [ ] $NAHSO_4$	Soil VOA Vials [ ] methanol [ ] H_2O	GL Soil container ( ) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H_2SO_4	PL As is [X] 250ml [ ] 500ml [ ] 1000ml	PL H_2SO_4 [ ] 250ml [X] 500ml	PL HNO_3 250ml [ ] 500ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is	As Is (alk)
53545	Station 1- Surface	SW	4/16	1000		x	x	x	x	x							1	1					1
53546	Station 1- Bottom	SW	4/16	1015		x	x	x	x	x							1	1					1
53547	Station 2	SW	4/16	0305		x	x	x	x	x							1	1					1

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	4-12-24	910
[signature]	[signature]	4/17/24	15:12

Comments, Special Requirements or Regulations:

Low detect on Cu, 0.004 ppm or better

results will be compared to MA industrial stormwater standards

MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

Turnaround Time:
- ☐ 1 Day*
- ☐ 2 Days*
- ☐ 3 Days*
- ☐ 4 Days*
- ☐ 5 Days*
- ☑ Standard
- ☐ Other ________

* SURCHARGES MAY APPLY

RI
- ☐ RES DEC
- ☐ I/C DEC
- ☐ GA Leachability
- ☐ GB Leachability
- ☐ GA -GW Objectives
- ☐ GB -GW Objectives
- ☐ Other

CT
- ☐ RCP Cert
- ☐ GWPC
- ☐ SWPC
- ☐ GA PMC
- ☐ GB PMC
- ☐ SWPC
- ☐ RES DEC
- ☐ I/C DEC

MA
- ☐ MCP Certification
- ☐ GW-1
- ☐ GW-2
- ☐ GW-3
- ☐ S-1
- ☐ S-2
- ☐ S-3
- ☐ SW Protection
- ☐ RCS-1 / RCGW-1
- ☐ RCS-2 / RCGW-2
- ☐ ________

State where samples were collected: MA

Data Format
- ☑ Excel
- ☑ PDF
- ☐ GIS/Key
- ☐ EQuIS
- ☐ Other

Data Package
- ☐ Tier II Checklist*
- ☐ Full Data Package*
- ☐ Phoenix Std
- ☐ Other

* SURCHARGE APPLIES

Tuesday, May 28, 2024

Attn: Jack Szczepanski
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: FREEMAN LAKE
SDG ID: GCQ62722
Sample ID#s: CQ62722 - CQ62724

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

May 28, 2024

SDG I.D.: GCQ62722

Project ID: FREEMAN LAKE

Client Id	Lab Id	Matrix
STATION 1	CQ62722	SEDIMENT
FREEMAN NORTH	CQ62723	SEDIMENT
FREEMAN WEST	CQ62724	SEDIMENT

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 28, 2024

FOR: Attn: Jack Szczepanski
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/30/24	9:45
Location Code:	TRC-RI	Received by:	SR1	05/01/24	12:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ62722
Phoenix ID: CQ62722

Project ID: FREEMAN LAKE
Client ID: STATION 1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Percent Moisture	48	0.1	%		05/01/24	HG	P.E.L.
Percent Solid	52		%		05/01/24	CV	SW846-%Solid
Phosphorus, Total as P	333	4.8	mg/Kg	5	05/02/24	LG	SM4500PE-11
Iron Bound Phosphorous	1.590	1.0	mg/Kg		05/17/24	*	SM4500PE-99
Loosely-sorbed Phosphorus	4.124	1.0	mg/Kg		05/17/24	*	SM4500PE-99

Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Iron-bound phosphorus and loosely-sorbed phosphorus were analyzed by Northeast Laboratories.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
May 28, 2024
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 28, 2024

FOR: Attn: Jack Szczepanski
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/30/24	10:20
Location Code:	TRC-RI	Received by:	SR1	05/01/24	12:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ62722
Phoenix ID: CQ62723

Project ID: FREEMAN LAKE
Client ID: FREEMAN NORTH

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Percent Moisture	88	0.1	%		05/01/24	HG	P.E.L.
Percent Solid	12		%		05/01/24	CV	SW846-%Solid
Phosphorus, Total as P	887	21	mg/Kg	5	05/02/24	LG	SM4500PE-11
Iron Bound Phosphorous	2.933	1.0	mg/Kg		05/17/24	*	SM4500PE-99
Loosely-sorbed Phosphorus	20.634	1.0	mg/Kg		05/17/24	*	SM4500PE-99

Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Iron-bound phosphorus and loosely-sorbed phosphorus were analyzed by Northeast Laboratories.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
May 28, 2024
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 28, 2024

FOR: Attn: Jack Szczepanski
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/30/24	9:55
Location Code:	TRC-RI	Received by:	SR1	05/01/24	12:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ62722
Phoenix ID: CQ62724

Project ID: FREEMAN LAKE
Client ID: FREEMAN WEST

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Percent Moisture	94	0.1	%		05/01/24	HG	P.E.L.
Percent Solid	6.0		%		05/01/24	CV	SW846-%Solid
Phosphorus, Total as P	323	8.3	mg/Kg	1	05/02/24	LG	SM4500PE-11
Iron Bound Phosphorous	13.546	1.0	mg/Kg		05/17/24	*	SM4500PE-99
Loosely-sorbed Phosphorus	33.881	1.0	mg/Kg		05/17/24	*	SM4500PE-99

Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Iron-bound phosphorus and loosely-sorbed phosphorus were analyzed by Northeast Laboratories.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
May 28, 2024
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

May 28, 2024

QA/QC Data

SDG I.D.: GCQ62722

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 729607 (mg/Kg), QC Sample No: CQ62723 (CQ62722, CQ62723, CQ62724)													
Phosphorus, Total as P	BRL	0.50	887	811	9.00	85.5			NC			75 - 125	30

Comment:

Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller

Phyllis Shiller, Laboratory Director
May 28, 2024

Sample Criteria Exceedances Report

GCQ62722 - TRC-RI

Criteria: None

State: MA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Comments

May 28, 2024 SDG I.D.: GCQ62722

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

GCQ62722

Sam Runyon

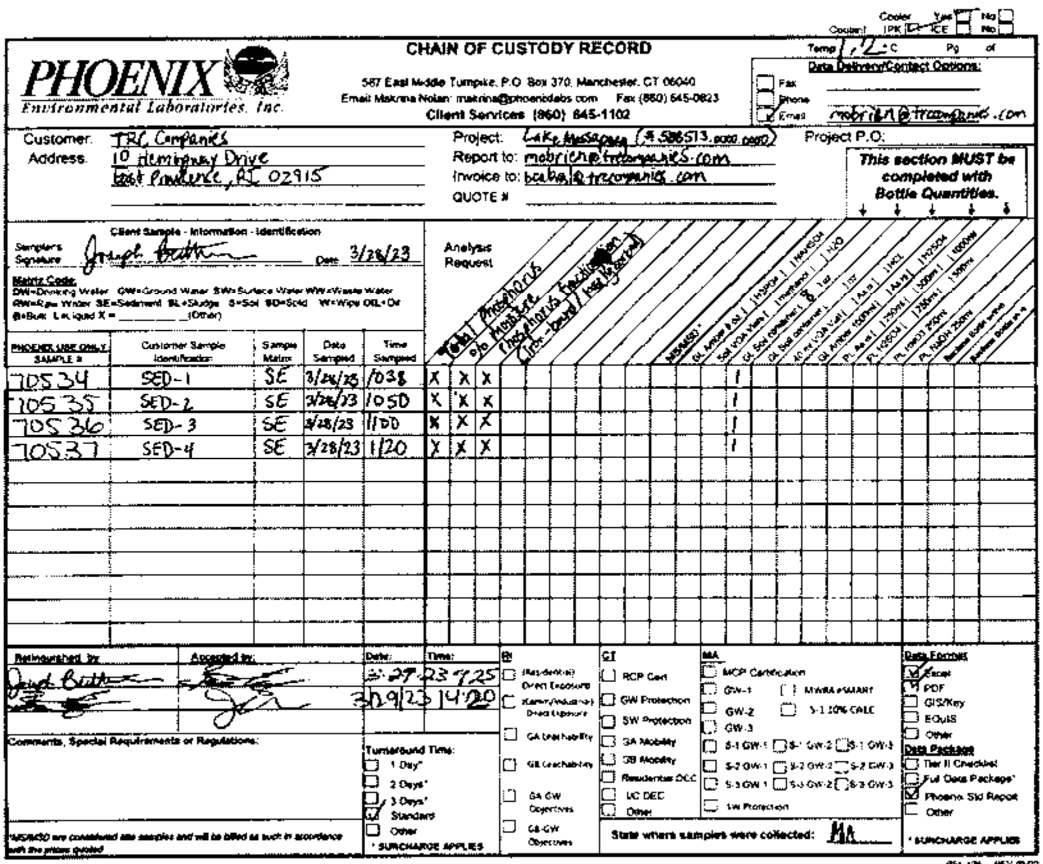
Subject: FW: [EXTERNAL] Freeman Lake Proj.

From: Szczepanski, Jack <jszczepanski@trccompanies.com>
Sent: Wednesday, May 1, 2024 4:07 PM
To: Sam Runyon <samr@phoenixlabs.com>
Subject: RE: [EXTERNAL] Freeman Lake Proj.

Hi Sam,

Our intent is to analyze the sediments for P contributing to internal loading. We would like to have the samples analyzed for TP, % Moisture, and Phosphorus Fractionation (iron-bound/loosely sorbed; I am told you might sub that last one out to Northeast Labs). I thought the tech I sent to do the sampling knew what to put on the form.

Here is an example of a previous COC for a different project with the same desired analysis. Does this help?



PHOENIX Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: Makrina Nolan: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp 1.2 °C Pg of

Data Delivery/Contact Options: Fax / Phone / Email: mobrien@trccompanies.com

Customer: TRC Companies
Address: 10 Hemingway Drive, East Providence, RI 02915

Project: Lake Massapoag (#586513.0000.0000)
Report to: mobrien@trccompanies.com
Invoice to: bcaba@trccompanies.com
QUOTE #

Project P.O.:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: [signature] Date: 3/28/23

Matrix Code: DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil B=Bulk L=Liquid X = ______ (Other)

Analysis Request: Total Phosphorus; % Moisture; Phosphorus Fractionation (Iron-bound / loosely sorbed)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Total Phosphorus	% Moisture	Phosphorus Fractionation	GL Soil container
70534	SED-1	SE	3/28/23	1038	X	X	X	1
70535	SED-2	SE	3/28/23	1050	X	X	X	1
70536	SED-3	SE	3/28/23	1100	X	X	X	1
70537	SED-4	SE	3/28/23	1120	X	X	X	1

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	3-27-23	7:25
[signature]	[signature]	3/29/23	14:20

Comments, Special Requirements or Regulations:

Turnaround Time: 1 Day* / 2 Days* / 3 Days* / ☑ Standard / Other — * SURCHARGE APPLIES

State where samples were collected: MA

Data Format: ☑ Excel / PDF / GIS/Key / EQuIS / Other
Data Package: Tier II Checklist / Full Data Package* / ☑ Phoenix Std Report / Other — * SURCHARGE APPLIES

John (Jack) Szczepanski, PhD
Senior Ecologist

6CQ60722

10 Hemingway Drive, 2nd Floor, East Providence, RI 02915
T 401.330.1223 M 732.642.5604
jszczepanski@trccompanies.com
LinkedIn Twitter TRCcompanies.com

From: Sam Runyon <samr@phoenixlabs.com>
Sent: Wednesday, May 1, 2024 1:49 PM
To: Szczepanski, Jack <jszczepanski@trccompanies.com>
Subject: [EXTERNAL] Freeman Lake Proj.
Importance: High

Good afternoon,

For the attached chain, it lists Total Phos. (internal loading) and Phos. (fractionation) for the analyses, but we are having a little trouble figuring out what exactly you need. Would you be able to provide more information on what exactly you are looking for?

Thank you,

Samantha Runyon

Client Services
Phoenix Environmental Laboratories
587 East Middle Tpke.
Manchester, CT 06040
samr@phoenixlabs.com
PH: 860-645-1102 ext:358
FX: 860-645-0823

Cooler: Yes ☐ No ☐
Coolant: IPK ☐ ICE ☐ No ☐

PHOENIX Environmental Laboratories, Inc.

CT/MA/RI CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp 2.2 °C Pg of

Data Delivery/Contact Options:
- ☐ Fax:
- ☐ Phone:
- ☑ Email: jszczepanski@trccompanies.com

Customer: TRC
Address: 10 Hemingway Drive, East Providence, RI 02915

Project: Freeman Lake
Report to: Jack Szczepanski
Invoice to:
Quote #

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: [signature] Date: 4/30/24

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = ____________(Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	Total Phos. (inorganic testing)	Phos. (fractionation)	GL Soil container (4) oz
62722	Station 1	SE	4/30	0945		x	x	1
62723	Freeman North	SE	4/30	1020		x	x	1
62724	Freeman West	SE	4/30	0955		x	x	1

Other bottle columns (all blank): GL Amber 8 oz. [ ] w/H$_3$PO$_4$ [ ] NAHSO$_4$; Soil VOA Vials [ ] methanol [ ] H$_2$O; GL Soil container ( ) oz; 40 ml VOA Vial [ ] As is [ ] HCl; GL Amber 1000ml [ ] As is [ ] H$_2$SO$_4$; PL As is [ ] 250ml [ ] 500ml [ ] 1000ml; PL H$_2$SO$_4$ [ ] 250ml [ ] 500ml; PL HNO$_3$ 250ml; PL NaOH 250ml; Bacteria Bottle w/thio; Bacteria Bottle as is

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	5/1/24	0915
		5/1/24	12:15

Comments, Special ~~Requirements or Regulations~~:

Turnaround Time:
- ☐ 1 Day*
- ☐ 2 Days*
- ☐ 3 Days*
- ☐ 4 Days*
- ☐ 5 Days*
- ☒ Standard
- ☐ Other

RI: ☐ RES DEC ☐ I/C DEC ☐ GA Leachability ☐ GB Leachability ☐ GA-GW Objectives ☐ GB-GW Objectives ☐ Other

CT: ☐ RCP Cert ☐ GWPC ☐ SWPC ☐ GA PMC ☐ GB PMC ☐ SWPC ☐ RES DEC ☐ I/C DEC

MA: ☐ MCP Certification ☐ GW-1 ☐ GW-2 ☐ GW-3 ☐ S-1 ☐ S-2 ☐ S-3 ☐ SW Protection ☐ RCS-1 / RCGW-1 ☐ RCS-2 / RCGW-2 ☐ S-1 Calc. ☐

Data Format: ☐ Excel ☐ PDF ☐ GIS/Key ☐ EQuIS ☐ Other

Data Package: ☐ Tier II Checklist* ☐ Full Data Package* ☐ Phoenix Std ☐ Other

*MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

* SURCHARGES MAY APPLY

State where samples were collected: MA

* SURCHARGE APPLIES

Form PEL-126 Rev. 9/23

Thursday, June 13, 2024

Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: 557159.0000.0000
SDG ID: GCQ84594
Sample ID#s: CQ84594 - CQ84599

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Telephone (860) 645-1102

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

June 13, 2024

SDG I.D.: GCQ84594

Project ID: 557159.0000.0000

Client Id	Lab Id	Matrix
STATION 1-SURFACE	CQ84594	SURFACE WATER
STATION 1-BOTTOM	CQ84595	SURFACE WATER
STATION 2	CQ84596	SURFACE WATER
NORTH-SS-OUTFALL	CQ84597	SURFACE WATER
EAST-SS-OUTFALL	CQ84598	SURFACE WATER
NORTHWEST-SS-OUTFALL	CQ84599	SURFACE WATER

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 13, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		05/30/24	9:55
Location Code:	TRC-RI	Received by:	CP	05/31/24	14:48
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ84594
Phoenix ID: CQ84594

Project ID: 557159.0000.0000
Client ID: STATION 1-SURFACE

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	32	20.0	mg/L	1	06/01/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.08	0.05	mg/L	1	06/12/24	KDB	E350.1
Nitrate-N	0.12	0.02	mg/L	1	05/31/24 20:13	S	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	05/31/24	S	SM4500PE-99
Nitrogen Tot Kjeldahl	0.49	0.10	mg/L	1	06/12/24	KDB	E351.1
Phosphorus, as P	0.021	0.003	mg/L	0.5	06/05/24	LG	SM4500PE-11
Total Suspended Solids	< 5.0	5.0	mg/L	1	06/05/24	JB/AMM	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
June 13, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 13, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		05/30/24	10:00
Location Code:	TRC-RI	Received by:	CP	05/31/24	14:48
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ84594
Phoenix ID: CQ84595

Project ID: 557159.0000.0000
Client ID: STATION 1-BOTTOM

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	32	20.0	mg/L	1	06/01/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.24	0.05	mg/L	1	06/12/24	KDB	E350.1
Nitrate-N	0.14	0.02	mg/L	1	05/31/24 20:16	S	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	05/31/24	S	SM4500PE-99
Nitrogen Tot Kjeldahl	0.89	0.10	mg/L	1	06/12/24	KDB	E351.1
Phosphorus, as P	0.035	0.003	mg/L	0.5	06/07/24	LG	SM4500PE-11
Total Suspended Solids	< 3.3	3.3	mg/L	0.7	06/05/24	JB/AMM	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
June 13, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 13, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		05/30/24	11:40
Location Code:	TRC-RI	Received by:	CP	05/31/24	14:48
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ84594
Phoenix ID: CQ84596

Project ID: 557159.0000.0000
Client ID: STATION 2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	32	20.0	mg/L	1	06/01/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	< 0.10	0.10	mg/L	2	06/12/24	KDB	E350.1
Nitrate-N	0.25	0.02	mg/L	1	05/31/24 20:22	S	E353.2
Soluble Reactive Phosphorus, as P	0.02	0.01	mg/L	1	05/31/24	S	SM4500PE-99
Nitrogen Tot Kjeldahl	1.45	0.20	mg/L	2	06/12/24	KDB	E351.1
Phosphorus, as P	0.126	0.003	mg/L	0.5	06/07/24	LG	SM4500PE-11
Total Suspended Solids	30	10	mg/L	2	06/05/24	JB/AMM	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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Phyllis Shiller

Phyllis Shiller, Laboratory Director
June 13, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 13, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		05/30/24	7:35
Location Code:	TRC-RI	Received by:	CP	05/31/24	14:48
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ84594
Phoenix ID: CQ84597

Project ID: 557159.0000.0000
Client ID: NORTH-SS-OUTFALL

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	44	20.0	mg/L	1	06/01/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	1.62	0.25	mg/L	5	06/12/24	KDB	E350.1
Nitrate-N	0.60	0.02	mg/L	1	05/31/24 20:23	S	E353.2
Nitrogen Tot Kjeldahl	3.62	0.50	mg/L	5	06/12/24	KDB	E351.1
Phosphorus, as P	0.178	0.003	mg/L	0.5	06/07/24	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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Phyllis Shiller, Laboratory Director
June 13, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 13, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		05/30/24	7:50
Location Code:	TRC-RI	Received by:	CP	05/31/24	14:48
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ84594
Phoenix ID: CQ84598

Project ID: 557159.0000.0000
Client ID: EAST-SS-OUTFALL

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	< 20.0	20.0	mg/L	1	06/01/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.26	0.25	mg/L	5	06/12/24	KDB	E350.1
Nitrate-N	0.16	0.02	mg/L	1	05/31/24 20:29	S	E353.2
Nitrogen Tot Kjeldahl	1.98	0.50	mg/L	5	06/12/24	KDB	E351.1
Phosphorus, as P	0.232	0.003	mg/L	0.5	06/07/24	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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Phyllis Shiller

Phyllis Shiller, Laboratory Director
June 13, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 13, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		05/30/24	8:25
Location Code:	TRC-RI	Received by:	CP	05/31/24	14:48
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ84594
Phoenix ID: CQ84599

Project ID: 557159.0000.0000
Client ID: NORTHWEST-SS-OUTFALL

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	31	20.0	mg/L	1	06/01/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.21	0.05	mg/L	1	06/12/24	KDB	E350.1
Nitrate-N	0.11	0.02	mg/L	1	05/31/24 20:30	S	E353.2
Nitrogen Tot Kjeldahl	0.62	0.10	mg/L	1	06/12/24	KDB	E351.1
Phosphorus, as P	0.024	0.003	mg/L	0.5	06/07/24	LG	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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Phyllis Shiller, Laboratory Director
June 13, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

June 13, 2024

QA/QC Data

SDG I.D.: GCQ84594

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 734462 (mg/L), QC Sample No: CQ82442 (CQ84594)													
Phosphorus, as P	BRL	0.01	9.60	9.13	5.00	107			106			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 734025 (mg/L), QC Sample No: CQ84488 (CQ84594, CQ84595, CQ84596, CQ84597, CQ84598, CQ84599)													
Alkalinity-CaCO3	BRL	5.00	<20.0	<20.0	NC	101						85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 734392 (mg/L), QC Sample No: CQ84558 (CQ84594, CQ84595)													
Total Suspended Solids	BRL	2.5	<2.0	<2.0	NC	104						85 - 115	
QA/QC Batch 734395 (mg/L), QC Sample No: CQ84806 (CQ84596)													
Total Suspended Solids	BRL	2.5	<2.0	<2.0	NC	96.0						85 - 115	
QA/QC Batch 734943 (mg/L), QC Sample No: CQ89650 (CQ84595, CQ84596, CQ84597, CQ84598, CQ84599)													
Phosphorus, as P	BRL	0.01	3.51	3.51	0	98.6			90.5			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 733963 (mg/L), QC Sample No: CQ84404 (CQ84594, CQ84595, CQ84596, CQ84597, CQ84598, CQ84599)													
Nitrate-N	BRL	0.02	0.06	0.06	NC	100			100			90 - 110	20
QA/QC Batch 733964 (mg/L), QC Sample No: CQ84404 (CQ84594, CQ84595, CQ84596)													
Nitrate-N	BRL	0.02	0.06	0.06	NC	100			100			90 - 110	20
QA/QC Batch 735344 (mg/L), QC Sample No: CQ84599 (CQ84594, CQ84595, CQ84596, CQ84597, CQ84598, CQ84599)													
Ammonia as Nitrogen	BRL	0.05	0.21	0.10	NC	107			101			90 - 110	20
Nitrogen Tot Kjeldahl	BRL	0.10	0.62	0.53	15.7	104			99.3			85 - 115	20
Comment:													
TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller

Phyllis Shiller, Laboratory Director
June 13, 2024

Sample Criteria Exceedances Report

GCQ84594 - TRC-RI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Comments

June 13, 2024 SDG I.D.: GCQ84594

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: ~~Yes~~ ☐ No ☐
Coolant: IPK ☐ ICE ☐ No ☐

PHOENIX Environmental Laboratories, Inc.

CT/MA/RI CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp ° C Pg of

Data Delivery/Contact Options:
☐ Fax:
☐ Phone:
☐ Email: Jszczepanski@trccompanies.com

Customer: TRC Environmental Corporation
Address: 10 Hemingway Drive
East Providence, RI 02915

Project: 557159.0000.0000
Report to: Jszczepanski@trccompanies.com
Invoice to:
Quote #

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature [signature] Date: 5/30/24

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = ____________(Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	Total Phosphorus	TKN	Nitrate-Nitrogen	Ammonia Nitrogen	Alkalinity	Soluble Reactive Phosphorus	Total Suspended Solids
84594	Station 1- Surface	SW	5/30	0955		x	x	x	x	x	X	X
84595	Station 1- Bottom	SW	5/30	1000		x	x	x	x	x	X	X
84596	Station 2	SW	5/30	1140		x	x	x	x	x	X	X
84597	North-SS-Outfall	SW	5/30	0735		X	X	X	X	X		
84598	East-SS-Outfall	SW	5/30	0750		X	X	X	X	X		
84599	Northwest-SS-Outfall	SW	5/30	0825		X	X	X	X	X		

SAMPLE #	GL Amber 8 oz [ ] w/H_3PO_4 [ ] $NAHSO_4$	Soil VOA Vials [ ] methanol [ ] H_2O	GL Soil container ( ) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H_2SO_4	PL As is [X] 250ml [ ] 500ml [ ] 1000ml	PL H_2SO_4 [ ] 250ml [X] 500ml	PL HNO_3 250ml [ ] 500ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is / As Is (alk)
84594						3	1					1
84595						3	1					1
84596						3	1					1
84597						1	1					1
84598						1	1					1
84599						1	1					1

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	5-31-24	855
[signature]	[signature]	5/31/24	14:48

Comments, Special Requirements or Regulations:
*Station 2 was Sampled at 1140
Low detect on Cu, 0.004 ppm or better
results will be compared to MA industrial stormwater standards

Turnaround Time:
☐ 1 Day*
☐ 2 Days*
☐ 3 Days*
☐ 4 Days*
☐ 5 Days*
☑ Standard
☐ Other

RI
☐ RES DEC
☐ I/C DEC
☐ GA Leachability
☐ GB Leachability
☐ GA -GW Objectives
☐ GB -GW Objectives
☐ Other

CT
☐ RCP Cert
☐ GWPC
☐ SWPC
☐ GA PMC
☐ GB PMC
☐ SWPC
☐ RES DEC
☐ I/C DEC

MA
☐ MCP Certification
☐ GW-1 ☐ RCS-1 / RCGW-1
☐ GW-2 ☐ RCS-2 / RCGW-2
☐ GW-3 ☐
☐ S-1
☐ S-2
☐ S-3
☐ SW Protection

Data Format
☑ Excel
☑ PDF
☐ GIS/Key
☐ EQuIS
☐ Other

Data Package
☐ Tier II Checklist*
☐ Full Data Package*
☐ Phoenix Std
☐ Other

MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

* SURCHARGES MAY APPLY

State where samples were collected: MA

* SURCHARGE APPLIES

PHOENIX
Environmental Laboratories, Inc.

Tuesday, July 09, 2024

Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: 557159.0000.0000
SDG ID: GCR05696
Sample ID#s: CR05696 - CR05698

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

July 09, 2024

SDG I.D.: GCR05696

Project ID: 557159.0000.0000

Client Id	Lab Id	Matrix
STATION 1-SURFACE	CR05696	SURFACE WATER
STATION 1-BOTTOM	CR05697	SURFACE WATER
STATION 2	CR05698	SURFACE WATER

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

July 09, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		06/26/24	10:05
Location Code:	TRC-RI	Received by:	CP	06/27/24	15:19
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR05696
Phoenix ID: CR05696

Project ID: 557159.0000.0000
Client ID: STATION 1-SURFACE

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	37	20.0	mg/L	1	06/28/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.13	0.05	mg/L	1	07/09/24	KDB	E350.1
Nitrate-N	0.03	0.02	mg/L	1	06/27/24 23:20	ER	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	06/28/24	ER	SM4500PE-99
Nitrogen Tot Kjeldahl	0.64	0.10	mg/L	1	07/09/24	KDB	E351.1
Phosphorus, as P	0.016	0.003	mg/L	0.5	06/28/24	LG	SM4500PE-11
Total Suspended Solids	< 5.0	5.0	mg/L	1	06/28/24	JB/EC	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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Phyllis Shiller

Phyllis Shiller, Laboratory Director
July 09, 2024
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

July 09, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		06/26/24	10:20
Location Code:	TRC-RI	Received by:	CP	06/27/24	15:19
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR05696
Phoenix ID: CR05697

Project ID: 557159.0000.0000
Client ID: STATION 1-BOTTOM

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	36	20.0	mg/L	1	06/28/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.18	0.05	mg/L	1	07/09/24	KDB	E350.1
Nitrate-N	0.04	0.02	mg/L	1	06/27/24 23:49	ER	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	06/28/24	ER	SM4500PE-99
Nitrogen Tot Kjeldahl	0.72	0.10	mg/L	1	07/09/24	KDB	E351.1
Phosphorus, as P	0.027	0.003	mg/L	0.5	06/28/24	LG	SM4500PE-11
Total Suspended Solids	< 10	10	mg/L	2	06/28/24	JB/EC	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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Phyllis Shiller

Phyllis Shiller, Laboratory Director
July 09, 2024
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

July 09, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		06/26/24	11:40
Location Code:	TRC-RI	Received by:	CP	06/27/24	15:19
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR05696
Phoenix ID: CR05698

Project ID: 557159.0000.0000
Client ID: STATION 2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	45	20.0	mg/L	1	06/28/24	MW/KDB	SM2320B-11
Ammonia as Nitrogen	0.20	0.05	mg/L	1	07/09/24	KDB	E350.1
Nitrate-N	0.29	0.02	mg/L	1	06/27/24 23:50	ER	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	06/28/24	ER	SM4500PE-99
Nitrogen Tot Kjeldahl	0.71	0.10	mg/L	1	07/09/24	KDB	E351.1
Phosphorus, as P	0.043	0.003	mg/L	0.5	06/28/24	LG	SM4500PE-11
Total Suspended Solids	10	10	mg/L	2	06/28/24	JB/EC	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

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Phyllis Shiller

Phyllis Shiller, Laboratory Director
July 09, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

July 09, 2024

QA/QC Data

SDG I.D.: GCR05696

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 738082 (mg/L), QC Sample No: CR05698 (CR05696, CR05697, CR05698)													
Total Suspended Solids	BRL	2.5	10	12	NC	107						85 - 115	
QA/QC Batch 738139 (mg/L), QC Sample No: CR06592 (CR05696, CR05697, CR05698)													
Phosphorus, as P	BRL	0.01	3.04	3.01	1.00	103			102			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 738113 (mg/L), QC Sample No: CR06756 (CR05696, CR05697, CR05698)													
Alkalinity-CaCO3	BRL	5.00	<20.0	<20.0	NC	106						85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 738024 (mg/L), QC Sample No: CR05705 (CR05696, CR05697, CR05698)													
Nitrate-N	BRL	0.02	<0.02	<0.02	NC	99.4			97.8			90 - 110	20
QA/QC Batch 739219 (mg/L), QC Sample No: CR05716 (CR05696, CR05697, CR05698)													
Ammonia as Nitrogen	BRL	0.05	0.07	0.09	NC	104			108			90 - 110	20
Nitrogen Tot Kjeldahl	BRL	0.10	0.25	0.29	NC	100			106			85 - 115	20
Comment:													
TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
July 09, 2024

Tuesday, July 09, 2024
Criteria: None
State: MA

Sample Criteria Exceedances Report

GCR05696 - TRC-RI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Cooler: Yes [x] ~~No~~ [ ]
Coolant: IPK [x] ~~ICE~~ [ ] No [ ]

CT/MA/RI CHAIN OF CUSTODY RECORD

Temp 2.3 C Pg of

PHOENIX Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Data Delivery/Contact Options:
- [ ] Fax:
- [ ] Phone:
- [ ] Email: Jszczepanski@trccompanies.com

Customer: TRC Environmental Corporation
Address: 10 Hemingway Drive
East Providence, RI 02915

Project: 557159.0000.0000
Report to: Jszczepanski@trccompanies.com
Invoice to:
Quote #

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature [signature] Date: 6/26/24

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe **OIL**=Oil
B=Bulk **L**=Liquid **X** = ___________(Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	Total Phosphorus	TKN	Nitrate-Nitrogen	Ammonia Nitrogen	Alkalinity	Soluble Reactive Phosphorus	Total Suspended Solids					GL Amber 8 oz. [ ] w/H_3PO_4 [ ] $NAHSO_4$	Soil VOA Vials [ ] methanol [ ] H_2O	GL Soil container ( )oz	GL Soil container ( )oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H_2SO_4	PL As is [X] 250ml [ ] 500ml [ ] 1000ml	PL H_2SO_4 [ ] 250ml [X] 500ml	PL HNO_3 250ml [ ] 500ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is	As Is (alk)
05696	Station 1- Surface	SW	6/26	1005		X	X	X	X	X	X	X											3	1					1
05697	Station 1- Bottom	SW	6/26	1020		X	X	X	X	X	X	X											3	1					1
05698	Station 2	SW	6/26	1140		X	X	X	X	X	X	X											3	1					1

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	6-27-24	945
[signature]	[signature]	6/27/24	15:19

Comments, Special Requirements or Regulations:
Note low detect on phos - 0.01 mg/L or better
~~Low detect on Cu, 0.004 ppm or better~~
results will be compared to MA industrial ~~stormwater standards~~

Turnaround Time:
- [ ] 1 Day*
- [ ] 2 Days*
- [ ] 3 Days*
- [ ] 4 Days*
- [ ] 5 Days*
- [x] Standard
- [ ] Other ________

RI
- [ ] RES DEC
- [ ] I/C DEC
- [ ] GA Leachability
- [ ] GB Leachability
- [ ] GA -GW Objectives
- [ ] GB -GW Objectives
- [ ] Other

CT
- [ ] RCP Cert
- [ ] GWPC
- [ ] SWPC
- [ ] GA PMC
- [ ] GB PMC
- [ ] SWPC
- [ ] RES DEC
- [ ] I/C DEC

MA
- [ ] MCP Certification
- [ ] GW-1
- [ ] GW-2
- [ ] GW-3
- [ ] S-1
- [ ] S-2
- [ ] S-3
- [ ] SW Protection
- [ ] RCS-1 / RCGW-1
- [ ] RCS-2 / RCGW-2
- [ ] ________

Data Format
- [x] Excel
- [x] PDF
- [ ] GIS/Key
- [ ] EQuIS
- [ ] Other

Data Package
- [ ] Tier II Checklist*
- [ ] Full Data Package*
- [ ] Phoenix Std
- [ ] Other

****MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.***

* SURCHARGES MAY APPLY

State where samples were collected: MA

* SURCHARGE APPLIES

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Comments

July 09, 2024 SDG I.D.: GCR05696

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Thursday, August 22, 2024

Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: 557157.0000.0000
SDG ID: GCR38214
Sample ID#s: CR38214 - CR38216

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

August 22, 2024

SDG I.D.: GCR38214

Project ID: 557157.0000.0000

Client Id	Lab Id	Matrix
STATION 1-SURFACE	CR38214	SURFACE WATER
STATION 1-BOTTOME	CR38215	SURFACE WATER
STATION 2	CR38216	SURFACE WATER

Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 22, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		08/08/24	9:40
Location Code:	TRC-RI	Received by:	CP	08/09/24	16:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR38214
Phoenix ID: CR38214

Project ID: 557157.0000.0000
Client ID: STATION 1-SURFACE

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	38	20.0	mg/L	1	08/10/24	MW/S/KDE	SM2320B-11
Ammonia as Nitrogen	0.08	0.05	mg/L	1	08/21/24	AMM	E350.1
Nitrate-N	< 0.02	0.02	mg/L	1	08/09/24 21:58	KG	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	08/09/24	KG	SM4500PE-99
Nitrogen Tot Kjeldahl	0.54	0.10	mg/L	1	08/21/24	AMM	E351.1
Phosphorus, as P	0.019	0.003	mg/L	0.5	08/16/24	BS	SM4500PE-11
Total Suspended Solids	3.6	2.2	mg/L	0.4	08/14/24	JB/AMM	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
August 22, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 22, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		08/08/24	9:50
Location Code:	TRC-RI	Received by:	CP	08/09/24	16:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR38214
Phoenix ID: CR38215

Project ID: 557157.0000.0000
Client ID: STATION 1-BOTTOME

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	46	20.0	mg/L	1	08/10/24	MW/S/KDE	SM2320B-11
Ammonia as Nitrogen	0.07	0.05	mg/L	1	08/21/24	AMM	E350.1
Nitrate-N	< 0.02	0.02	mg/L	1	08/09/24 22:02	KG	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	08/09/24	KG	SM4500PE-99
Nitrogen Tot Kjeldahl	0.95	0.10	mg/L	1	08/21/24	AMM	E351.1
Phosphorus, as P	0.035	0.003	mg/L	0.5	08/16/24	BS	SM4500PE-11
Total Suspended Solids	4.8	4.0	mg/L	0.8	08/14/24	JB/AMM	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
August 22, 2024
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 22, 2024

FOR: Attn:
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		08/08/24	11:15
Location Code:	TRC-RI	Received by:	CP	08/09/24	16:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR38214
Phoenix ID: CR38216

Project ID: 557157.0000.0000
Client ID: STATION 2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	24	20.0	mg/L	1	08/10/24	MW/S/KDE	SM2320B-11
Ammonia as Nitrogen	0.08	0.05	mg/L	1	08/21/24	AMM	E350.1
Nitrate-N	0.32	0.02	mg/L	1	08/09/24 22:48	KG	E353.2
Soluble Reactive Phosphorus, as P	0.01	0.01	mg/L	1	08/09/24	KG	SM4500PE-99
Nitrogen Tot Kjeldahl	0.52	0.10	mg/L	1	08/21/24	AMM	E351.1
Phosphorus, as P	0.050	0.003	mg/L	0.5	08/16/24	BS	SM4500PE-11
Total Suspended Solids	< 5.0	5.0	mg/L	1	08/14/24	JB/AMM	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
August 22, 2024
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

August 22, 2024

QA/QC Data

SDG I.D.: GCR38214

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 744308 (mg/L), QC Sample No: CR37839 (CR38214, CR38215, CR38216)													
Alkalinity-CaCO3	BRL	5.00	32	32	NC	108						85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 744733 (mg/L), QC Sample No: CR38240 (CR38214, CR38215, CR38216)													
Total Suspended Solids	BRL	2.5	<2.0	2.0	NC	95.0						85 - 115	
QA/QC Batch 745236 (mg/L), QC Sample No: CR38691 (CR38214, CR38215, CR38216)													
Phosphorus, as P	BRL	0.01	0.114	0.112	1.80	96.9			103			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 744298 (mg/L), QC Sample No: CR38214 (CR38214, CR38215, CR38216)													
Nitrate-N	BRL	0.02	<0.02	<0.02	NC	101			101			90 - 110	20
QA/QC Batch 745604 (mg/L), QC Sample No: CR38214 (CR38214, CR38215, CR38216)													
Ammonia as Nitrogen	BRL	0.05	0.08	0.08	NC	98.3			99.7			90 - 110	20
Nitrogen Tot Kjeldahl	BRL	0.10	0.54	0.54	0	95.2			104			85 - 115	20
Comment:													
TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller

Phyllis Shiller, Laboratory Director
August 22, 2024

Thursday, August 22, 2024
Criteria: None
State: MA

Sample Criteria Exceedances Report

GCR38214 - TRC-RI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Comments

August 22, 2024 SDG I.D.: GCR38214

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes [x] No [ ]
Coolant: IPK [x] ICE [ ] No [ ]

CT/MA/RI CHAIN OF CUSTODY RECORD

PHOENIX *Environmental Laboratories, Inc.*

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp 1.4 °C Pg of

Data Delivery/Contact Options:
- [ ] Fax:
- [ ] Phone:
- [x] Email: jszczepanski@trccompanies.com

Customer: TRC
Address: 10 Hemingway Drive
East Providence R I 02915

Project: 597159.0000.0000
Report to: jszczepanski@trccompanies.com
Invoice to:
Quote #

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature [signature] Date: 8/8/24

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = ____________(Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	Total Phos	TKN	Nitrate-Nitrogen	Ammonia Nitrogen	Alkalinity	Soluble Reactive Phos	TSS	GL Amber 8 oz [ ] w/H$_3$PO$_4$ [ ] NAHSO$_4$	Soil VOA Vials [ ] methanol [ ] H$_2$O	GL Soil container ( ) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H$_2$SO$_4$	PL As is [ ] 250ml [ ] 500ml [ ] 1000ml	PL H$_2$SO$_4$ [ ] 250ml [ ] 500ml	PL HNO$_3$ 250ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is	Alk
38214	Station 1 Surface	SW	8/8	0940		X	X	X	X	X	X	X						3	1						1
38215	Station 1-Bottom	SW	8/8	0950		X	X	X	X	X	X	X						3	1						1
38216	Station 2	SW	8/8	1115		X	X	X	X	X	X	X						3	1						1

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	8-9-24	9:15
[signature]	Ashley Lee	8/9/24	16:46

Comments, Special Requirements or Regulations:
Note low detect on phos - 0.01 mg/L or better

Turnaround Time:
- [ ] 1 Day*
- [ ] 2 Days*
- [ ] 3 Days*
- [ ] 4 Days*
- [ ] 5 Days*
- [x] Standard
- [ ] Other

* SURCHARGES MAY APPLY

RI
- [ ] RES DEC
- [ ] I/C DEC
- [ ] GA Leachability
- [ ] GB Leachability
- [ ] GA-GW Objectives
- [ ] GB-GW Objectives
- [ ] Other

CT
- [ ] RCP Cert
- [ ] GWPC
- [ ] SWPC
- [ ] GA PMC
- [ ] GB PMC
- [ ] SWPC
- [ ] RES DEC
- [ ] I/C DEC

MA
- [ ] MCP Certification
- [ ] GW-1
- [ ] GW-2
- [ ] GW-3
- [ ] S-1
- [ ] S-2
- [ ] S-3
- [ ] SW Protection
- [ ] RCS-1 / RCGW-1
- [ ] RCS-2 / RCGW-2
- [ ] S-1 Calc
- [ ] ____________

Data Format
- [ ] Excel
- [ ] PDF
- [ ] GIS/Key
- [ ] EQuIS
- [ ] Other

Data Package
- [ ] Tier II Checklist*
- [ ] Full Data Package*
- [x] Phoenix Std
- [ ] Other

* SURCHARGE APPLIES

MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

State where samples were collected: MA

Form PEL-126 Rev. 9/23

Monday, October 14, 2024

Attn: Matt Ladewig
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: 557159.0000.0000
SDG ID: GCR78239
Sample ID#s: CR78239 - CR78241

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

October 14, 2024

SDG I.D.: GCR78239

Project ID: 557159.0000.0000

Client Id	Lab Id	Matrix
STATION 1-SURFACE	CR78239	SURFACE WATER
STATION 1-BOTTOM	CR78240	SURFACE WATER
STATION 2	CR78241	SURFACE WATER

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

Analysis Report

October 14, 2024

FOR: Attn: Matt Ladewig
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		10/02/24	9:15
Location Code:	TRC-RI	Received by:	CP	10/03/24	15:50
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR78239
Phoenix ID: CR78239

Project ID: 557159.0000.0000
Client ID: STATION 1-SURFACE

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	33	20.0	mg/L	1	10/04/24	MW	SM2320B-11
Chloride	108	3.0	mg/L	1	10/07/24	ER	SM4500CLE-11
Ammonia as Nitrogen	0.08	0.05	mg/L	1	10/11/24	KDB	E350.1
Nitrate-N	< 0.02	0.02	mg/L	1	10/03/24 22:56	ER	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	10/04/24	ER	SM4500PE-99
Nitrogen Tot Kjeldahl	0.52	0.10	mg/L	1	10/11/24	KDB	E351.1
Phosphorus, as P	0.052	0.003	mg/L	0.5	10/10/24	BS	SM4500PE-11
Total Suspended Solids	< 2.5	2.5	mg/L	0.5	10/07/24	AK/EC	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
October 14, 2024
Reviewed and Released by: Anil Makol, Project Manager

Ver 1

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

Analysis Report

October 14, 2024

FOR: Attn: Matt Ladewig
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		10/02/24	9:25
Location Code:	TRC-RI	Received by:	CP	10/03/24	15:50
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR78239
Phoenix ID: CR78240

Project ID: 557159.0000.0000
Client ID: STATION 1-BOTTOM

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	65	20.0	mg/L	1	10/04/24	MW	SM2320B-11
Chloride	97.8	3.0	mg/L	1	10/07/24	ER	SM4500CLE-11
Ammonia as Nitrogen	1.21	0.05	mg/L	1	10/11/24	KDB	E350.1
Nitrate-N	< 0.02	0.02	mg/L	1	10/03/24 23:07	ER	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	10/04/24	ER	SM4500PE-99
Nitrogen Tot Kjeldahl	1.65	0.10	mg/L	1	10/11/24	KDB	E351.1
Phosphorus, as P	0.037	0.003	mg/L	0.5	10/10/24	BS	SM4500PE-11
Total Suspended Solids	3.3	2.8	mg/L	0.6	10/07/24	AK/EC	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller

Phyllis Shiller, Laboratory Director
October 14, 2024
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

Analysis Report

October 14, 2024

FOR: Attn: Matt Ladewig
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:		10/02/24	10:40
Location Code:	TRC-RI	Received by:	CP	10/03/24	15:50
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR78239
Phoenix ID: CR78241

Project ID: 557159.0000.0000
Client ID: STATION 2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Alkalinity-CaCO3	53	20.0	mg/L	1	10/04/24	MW	SM2320B-11
Chloride	98.2	3.0	mg/L	1	10/07/24	ER	SM4500CLE-11
Ammonia as Nitrogen	0.08	0.05	mg/L	1	10/11/24	KDB	E350.1
Nitrate-N	0.37	0.02	mg/L	1	10/03/24 23:08	ER	E353.2
Soluble Reactive Phosphorus, as P	< 0.01	0.01	mg/L	1	10/04/24	ER	SM4500PE-99
Nitrogen Tot Kjeldahl	0.43	0.10	mg/L	1	10/11/24	KDB	E351.1
Phosphorus, as P	0.037	0.003	mg/L	0.5	10/10/24	BS	SM4500PE-11
Total Suspended Solids	< 2.5	2.5	mg/L	0.5	10/07/24	AK/EC	SM2540D-15

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
October 14, 2024
Reviewed and Released by: Anil Makol, Project Manager

Ver 1

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

October 14, 2024

QA/QC Data

SDG I.D.: GCR78239

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 753126 (mg/L), QC Sample No: CR78109 (CR78239, CR78240, CR78241)													
Phosphorus, as P	BRL	0.01	0.101	0.119	16.4	98.3			97.0			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 752449 (mg/L), QC Sample No: CR78196 (CR78239, CR78240, CR78241)													
Total Suspended Solids	BRL	2.5	<2.0	<2.0	NC	105						85 - 115	
QA/QC Batch 752294 (mg/L), QC Sample No: CR78239 (CR78239, CR78240, CR78241)													
Alkalinity-CaCO3	BRL	5.00	33	31	NC	100						85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 752145 (mg/L), QC Sample No: CR77708 (CR78239, CR78240, CR78241)													
Nitrate as Nitrogen	BRL	0.05	<0.01	<0.05	NC	95.1			95.0			90 - 110	20
QA/QC Batch 752585 (mg/L), QC Sample No: CR78159 (CR78239, CR78240, CR78241)													
Chloride	BRL	3.0	14.6	14.5	NC	101			103			90 - 110	20
QA/QC Batch 752140 (mg/L), QC Sample No: CR78165 (CR78239)													
Nitrate-N	BRL	0.02	0.29	0.29	0	95.2			99.0			90 - 110	20
QA/QC Batch 752142 (mg/L), QC Sample No: CR78543 (CR78240, CR78241)													
Nitrate-N	BRL	0.02	0.03	0.03	NC	94.3			99.6			90 - 110	20
QA/QC Batch 753015 (mg/L), QC Sample No: CR78184 (CR78239, CR78240, CR78241)													
Ammonia as Nitrogen	BRL	0.05	1.40	1.40	0	91.7			91.0			90 - 110	20
Nitrogen Tot Kjeldahl	BRL	0.10	2.94	2.74	7.00	93.5			108			85 - 115	20
Comment:													
TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

- RPD - Relative Percent Difference
- LCS - Laboratory Control Sample
- LCSD - Laboratory Control Sample Duplicate
- MS - Matrix Spike
- MS Dup - Matrix Spike Duplicate
- NC - No Criteria
- Intf - Interference
- (ISO) - Isotope Dilution

Phyllis Shiller

Phyllis Shiller, Laboratory Director
October 14, 2024

Sample Criteria Exceedances Report

GCR78239 - TRC-RI

Criteria: None

State: MA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Comments

October 14, 2024 SDG I.D.: GCR78239

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes ☒ No ☐
Coolant: IPK ☒ ICE ☐ No ☐

PHOENIX Environmental Laboratories, Inc.

CT/MA/RI CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp 1.1 °C Pg of

Data Delivery/Contact Options:
☐ Fax:
☐ Phone:
☐ Email: mladewig@trccompanies.com

Customer: TRC Environmental Corporation
Address: 10 Hemingway Drive
East Providence, RI 02915

Project: 557159.0000.0000
Report to: Matt Ladewig
Invoice to:
Quote #

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature ____________ Date: ________

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = __________(Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	Total Phosphorus	TKN	Nitrate-Nitrogen	Ammonia Nitrogen	Alkalinity	Soluble Reactive Phosphorus	Total Suspended Solids	Chloride			
78239	Station 1- Surface	SW	10/2	0915		X	X	X	X	X	X	X	X			
78240	Station 1- Bottom	SW	10/2	0925		X	X	X	X	X	X	X	X			
78241	Station 2	SW	10/2	1040		X	X	X	X	X	X	X	X			

PHOENIX USE ONLY SAMPLE #	GL Amber 8 oz. [ ] w/H3PO4 [ ] NAHSO4	Soil VOA Vials [ ] methanol [ ] H2O	GL Soil container ( ) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H2SO4	PL As is [X] 250ml [ ] 500ml [ ] 1000ml	PL H2SO4 [ ] 250ml [ ] 500ml	PL HNO3 250ml [X] 500ml	PL NaOH 250ml [ ] 500ml	Bacteria Bottle w/thio	Bacteria Bottle as is	As Is (alk)
78239							4	1					1
78240							4	1					1
78241							4	1					1

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	10/3/04	940
[signature]	[signature]	10/3/04	15:50

Comments, Special Requirements or Regulations:
Note low detect on phos -0.01 mg/L or better
~~Low detect on Cu, 0.004 ppm or better~~
~~results will be compared to MA industrial stormwater standards.~~

Turnaround Time:
☐ 1 Day*
☐ 2 Days*
☐ 3 Days*
☐ 4 Days*
☐ 5 Days*
☑ Standard
☐ Other

RI
☐ RES DEC
☐ I/C DEC
☐ GA Leachability
☐ GB Leachability
☐ GA -GW Objectives
☐ GB -GW Objectives
☐ Other

CT
☐ RCP Cert
☐ GWPC
☐ SWPC
☐ GA PMC
☐ GB PMC
☐ SWPC
☐ RES DEC
☐ I/C DEC

MA
☐ MCP Certification
☐ GW-1 ☐ RCS-1 / RCGW-1
☐ GW-2 ☐ RCS-2 / RCGW-2
☐ GW-3 ☐
☐ S-1
☐ S-2
☐ S-3
☐ SW Protection

Data Format
☑ Excel
☑ PDF
☐ GIS/Key
☐ EQuIS
☐ Other

Data Package
☐ Tier II Checklist*
☐ Full Data Package*
☑ Phoenix Std
☐ Other

MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

* SURCHARGES MAY APPLY

State where samples were collected: MA

* SURCHARGE APPLIES

Phytoplankton Sample Analysis

Sample: Freeman Lake
Sample Site: Sta 1
Sample Depth: 0
Sample Date: 26-Oct-23

Total Density (#/mL): 1,574
Total Biovolume (um^3/mL): 819,849
Trophic State Index: 48.4

	Species	Density #/mL	Density Percent	Biovolume um^3/mL	Biovolume Percent	Group
1	Microcystis aeruginosa	473	30.1	37,879	4.6	bluegreen
2	Aphanizomenon flos-aquae	343	21.8	475,787	58.0	bluegreen
3	Rhodomonas minuta	189	12.0	3,788	0.5	cryptophyte
4	Chrysococcus rufescens	118	7.5	10,062	1.2	chrysophyte
5	Cryptomonas erosa	107	6.8	55,398	6.8	cryptophyte
6	Ankistrodesmus falcatus	59	3.8	1,480	0.2	green
7	Asterionella formosa	36	2.3	15,625	1.9	diatom
8	Mallomonas sp.	36	2.3	13,494	1.6	chrysophyte
9	Kephyrion spirale	24	1.5	1,491	0.2	chrysophyte
10	Kephyrion littorale	24	1.5	2,249	0.3	chrysophyte
11	Melosira ambigua	24	1.5	41,833	5.1	diatom
12	Anabaena flos-aquae	12	0.8	7,931	1.0	bluegreen
13	Dinobryon sertularia	12	0.8	2,841	0.3	chrysophyte
14	Synedra radians	12	0.8	4,261	0.5	diatom
15	Cocconeis placentula	12	0.8	5,445	0.7	diatom
16	Nitzschia amphibia	12	0.8	1,136	0.1	diatom
17	Caloneis ventricosa	12	0.8	2,900	0.4	diatom
18	Tabellaria fenestrata	12	0.8	56,819	6.9	diatom
19	Scenedesmus bijuga	12	0.8	3,314	0.4	green
20	Chlamydomonas sp.	12	0.8	3,847	0.5	green
21	Sphaerocystis schroeteri	12	0.8	6,629	0.8	green
22	Trachelomonas volvocina	12	0.8	22,313	2.7	euglenoid
23	Anabaena planctonica	12	0.8	43,324	5.3	bluegreen
					100.0	

Anabaena flos-aquae cells/mL = 118

Aphanizomenon flos-aquae cells/mL = 7,552

Microcystis aeruginosa cells/mL = 4,735

Anabaena planctonica cells/mL = 237

Phytoplankton Sample Analysis

Sample: Freeman L
Sample Site: Sta 1
Sample Depth: 0.5
Sample Date: 16-Apr-24

Total Density (#/mL): 2,523
Total Biovolume (um^3/mL): 1,174,762
Trophic State Index: 51.0

	Species	Density #/mL	Density Percent	Biovolume um^3/mL	Biovolume Percent	Group
1	Synedra radians	618	24.5	222,411	18.9	diatom
2	Synedra rumpens	335	13.3	46,850	4.0	diatom
3	Cryptomonas erosa	232	9.2	120,473	10.3	cryptophyte
4	Dinobryon sertularia	206	8.2	138,389	11.8	chrysophyte
5	Chrysococcus rufescens	180	7.1	15,316	1.3	chrysophyte
6	Rhodomonas minuta	154	6.1	3,089	0.3	cryptophyte
7	Diatoma tenue	129	5.1	134,373	11.4	diatom
8	Asterionella formosa	129	5.1	101,938	8.7	diatom
9	Cyclotella stelligera	103	4.1	8,495	0.7	diatom
10	Kephyrion littorale	103	4.1	9,782	0.8	chrysophyte
11	Diatoma tenue elongatum	77	3.1	127,886	10.9	diatom
12	Navicula cryptocephala	51	2.0	9,525	0.8	diatom
13	Chlamydomonas sp.	26	1.0	8,366	0.7	green
14	Nitzschia frustulum	26	1.0	3,089	0.3	diatom
15	Cocconeis placentula	26	1.0	11,841	1.0	diatom
16	Peridinium cinctum	26	1.0	108,116	9.2	dinoflagellate
17	Achnanthes linearis	26	1.0	3,398	0.3	diatom
18	Cymbella affinis	26	1.0	46,336	3.9	diatom
19	Chrysosphaerella sp.	26	1.0	24,712	2.1	chrysophyte
20	Tabellaria flocculosa	26	1.0	30,376	2.6	diatom

Phytoplankton Sample Analysis

Sample: Freeman Lake
Sample Site: Sta 1
Sample Depth:
Sample Date: 30-May-24

Total Density (#/mL): 1,137
Total Biovolume (um^3/mL): 960,824
Trophic State Index: 49.6

	Species	Density #/mL	Density Percent	Biovolume um^3/mL	Biovolume Percent	Group
1	Dinobryon sertularia	457	40.2	328,919	34.2	chrysophyte
2	Cryptomonas erosa	233	20.5	121,303	12.6	cryptophyte
3	Rhodomonas minuta	204	17.9	4,082	0.4	cryptophyte
4	Ankistrodesmus falcatus	97	8.5	2,430	0.3	green
5	Anabaena flos-aquae	29	2.6	39,074	4.1	bluegreen
6	Fragilaria crotonensis	29	2.6	146,964	15.3	diatom
7	Glenodinium sp.	10	0.9	6,804	0.7	dinoflagellate
8	Oocystis lacustris	10	0.9	3,033	0.3	green
9	Kephyrion sp.	10	0.9	612	0.1	chrysophyte
10	Ceratium hirundinella	10	0.9	95,254	9.9	dinoflagellate
11	Nitzschia capitellata	10	0.9	3,499	0.4	diatom
12	Tabellaria fenestrata	10	0.9	186,621	19.4	diatom
13	Asterionella formosa	10	0.9	17,107	1.8	diatom
14	Oocystis pusilla	10	0.9	4,199	0.4	green
15	Kephyrion littorale	10	0.9	923	0.1	chrysophyte

Anabaena flos-aquae cells/mL = 583

Phytoplankton Sample Analysis

Sample: Freeman Lake
Sample Site: Sta 1
Sample Depth:
Sample Date: 26-Jun-24

Total Density (#/mL): 530
Total Biovolume (um^3/mL): 733,890
Trophic State Index: 47.6

	Species	Density #/mL	Density Percent	Biovolume um^3/mL	Biovolume Percent	Group
1	Rhodomonas minuta	148	28.0	2,965	0.4	cryptophyte
2	Cryptomonas erosa	99	18.6	51,389	7.0	cryptophyte
3	Anabaena planctonica	67	12.7	283,604	38.6	bluegreen
4	Aphanizomenon flos-aquae	49	9.3	74,711	10.2	bluegreen
5	Sphaerocystis schroeteri	36	6.8	27,671	3.8	green
6	Ankistrodesmus falcatus	27	5.1	674	0.1	green
7	Tabellaria fenestrata	18	3.4	120,746	16.5	diatom
8	Kephyrion littorale	9	1.7	853	0.1	chrysophyte
9	Fragilaria crotonensis	9	1.7	113,199	15.4	diatom
10	Kephyrion sp.	9	1.7	566	0.1	chrysophyte
11	Oocystis pusilla	9	1.7	2,911	0.4	green
12	Anabaena flos-aquae	9	1.7	30,097	4.1	bluegreen
13	Stephanodiscus hantzschii	4	0.8	539	0.1	diatom
14	Synedra radians	4	0.8	1,617	0.2	diatom
15	Aphanothece sp.	4	0.8	539	0.1	bluegreen
16	Synedra rumpens	4	0.8	629	0.1	diatom
17	Trachelomonas volvocina	4	0.8	8,467	1.2	euglenoid
18	Dinobryon sertularia	4	0.8	2,156	0.3	chrysophyte
19	Achnanthes minutissima	4	0.8	225	0.0	diatom
20	Trachelomonas scabra	4	0.8	7,187	1.0	euglenoid
21	Glenodinium sp.	4	0.8	3,144	0.4	dinoflagellate

Anabaena planctonica cells/mL = 1,550

Aphanizomenon flos-aquae cells/mL = 1,186

Anabaena flos-aquae cells/mL = 449

Aquatic Analysts **Sample ID:** ZX64

Phytoplankton Sample Analysis

Sample: Freeman L
Sample Site: Station 1
Sample Depth:
Sample Date: 8-Aug-24

Total Density (#/mL): 1,503
Total Biovolume (um^3/mL): 1,250,372
Trophic State Index: 51.5

	Species	Density #/mL	Density Percent	Biovolume um^3/mL	Biovolume Percent	Group
1	Selenastrum minutum	426	28.3	23,001	1.8	green
2	Cryptomonas erosa	200	13.3	104,231	8.3	cryptophyte
3	Ankistrodesmus falcatus	150	10.0	5,262	0.4	green
4	Anabaena planctonica	150	10.0	522,709	41.8	bluegreen
5	Aphanizomenon flos-aquae	138	9.2	173,635	13.9	bluegreen
6	Synedra radians	75	5.0	27,060	2.2	diatom
7	Cyclotella stelligera	63	4.2	3,445	0.3	diatom
8	Crucigenia quadrata	38	2.5	6,389	0.5	green
9	Glenodinium sp.	38	2.5	26,308	2.1	dinoflagellate
10	Rhodomonas minuta	38	2.5	752	0.1	cryptophyte
11	Scenedesmus quadricauda	25	1.7	4,886	0.4	green
12	Trachelomonas volvocina	25	1.7	47,230	3.8	euglenoid
13	Ceratium hirundinella	13	0.8	122,772	9.8	dinoflagellate
14	Anabaena flos-aquae	13	0.8	8,394	0.7	bluegreen
15	Achnanthes lanceolata	13	0.8	2,255	0.2	diatom
16	Oocystis pusilla	13	0.8	5,412	0.4	green
17	Tabellaria fenestrata	13	0.8	150,333	12.0	diatom
18	Navicula sp.	13	0.8	1,879	0.2	diatom
19	Euglena sp.	13	0.8	7,266	0.6	euglenoid
20	Achnanthes minutissima	13	0.8	626	0.1	diatom
21	Fragilaria construens venter	13	0.8	3,608	0.3	diatom
22	Gomphonema angustatum	13	0.8	2,255	0.2	diatom
23	Cymbella microcephala	13	0.8	664	0.1	diatom

Aphanizomenon flos-aquae cells/mL = 2,756

Anabaena planctonica cells/mL = 2,856

Anabaena flos-aquae cells/mL = 125

Aquatic Analysts **Sample ID:** ZX88

Phytoplankton Sample Analysis

Sample: Freeman L
Sample Site: Sta 1
Sample Depth:
Sample Date: 2-Oct-24

Total Density (#/mL): 936
Total Biovolume (um^3/mL): 1,420,222
Trophic State Index: 52.4

	Species	Density #/mL	Density Percent	Biovolume um^3/mL	Biovolume Percent	Group
1	Aphanizomenon flos-aquae	226	24.1	326,750	23.0	bluegreen
2	Cryptomonas erosa	113	12.0	58,630	4.1	cryptophyte
3	Synedra radians	68	7.2	24,354	1.7	diatom
4	Ankistrodesmus falcatus	56	6.0	1,409	0.1	green
5	Anabaena planctonica	56	6.0	392,032	27.6	bluegreen
6	Cyclotella stelligera	56	6.0	3,101	0.2	diatom
7	Tabellaria fenestrata	34	3.6	267,894	18.9	diatom
8	Achnanthes minutissima	34	3.6	1,691	0.1	diatom
9	Cyclotella meneghiniana	23	2.4	8,569	0.6	diatom
10	Melosira ambigua	23	2.4	132,820	9.4	diatom
11	Fragilaria crotonensis	23	2.4	75,768	5.3	diatom
12	Navicula anglica	23	2.4	8,118	0.6	diatom
13	Tetraedron sp.	11	1.2	304	0.0	green
14	Synedra delicatissima	11	1.2	7,442	0.5	diatom
15	Trachelomonas volvocina	11	1.2	21,253	1.5	euglenoid
16	Asterionella formosa	11	1.2	2,481	0.2	diatom
17	Chrysococcus rufescens	11	1.2	958	0.1	chrysophyte
18	Melosira granulata	11	1.2	24,805	1.7	diatom
19	Sphaerocystis schroeteri	11	1.2	3,157	0.2	green
20	Navicula cryptocephala	11	1.2	2,086	0.1	diatom
21	Crucigenia quadrata	11	1.2	958	0.1	green
22	Fragilaria capucina mesolepta	11	1.2	5,750	0.4	diatom
23	Pediastrum duplex	11	1.2	6,134	0.4	green
24	Trachelomonas robusta	11	1.2	23,678	1.7	euglenoid
25	Cymbella microcephala	11	1.2	598	0.0	diatom
26	Chlamydomonas sp.	11	1.2	3,664	0.3	green
27	Cocconeis placentula	11	1.2	5,187	0.4	diatom
28	Amphora ovalis	11	1.2	6,517	0.5	diatom
29	Kephyrion littorale	11	1.2	1,071	0.1	chrysophyte
30	Navicula pupula	11	1.2	3,044	0.2	diatom

Anabaena planctonica cells/mL = 2,142

Aphanizomenon flos-aquae cells/mL = 5,187

Aquatic Analysts Sample ID: AX13

Appendix B: Written Public Comments Received

Public Comments/Questions – Freeman Lake:

Wanda Dunn:

1) **Why is the town targeting herbicides at the spillway** (where only the Chelmsford Fire Department is allowed to use as the gate is supposed to be locked), **and Russell Road at a private beach which is also a private road**?

2) **We are repeating the same argument as we did with Solitude putting herbicides at Varney Park:**

a) Are these weeds growing in the swimming area or are they plant fragments and debris. If plant fragments and debris, this is a natural effect on that side of the lake. **Herbicides will do nothing to get rid of plant fragments and debris that float up on the beach.**

b) The town used to have funds to pay high school kids to rake the weeds and clean up the goose debris every summer. Then when a volunteer offered to do it for free, the high school kids were out of a job. The town had neglected to put funds aside during this time, so when the volunteer moved out of the area, they never rehired someone to do the job. **Why not use the $15K to have a summer hire again, which only takes a couple hours at most.**

c) As I mentioned in the meeting on 13th February, the percentage of weeds from the 1993 report from the Department of Environmental Protection to the 2024 report from TRC, the percentage of **weed coverage HAS NOT CHANGED at Varney Park**. The 2024 TRC report even shows an area around the beach that has dropped in percentage of coverage.

d) The **NCWD needs to be notified in a respectable time** that the town is proposing herbicides so they may have their chemist review the effects. We discussed this with regard to Solitude. The residual effects of an herbicide that can flow south toward the spillway, into Stony Brook and towards the drinking wells further down still needs to be addressed.

3) **TRC did not map any vegetation in the middle of Freeman Lake.** We that live here and use the lake know this is where the cluster of weeds are most prominent. I am surprised that TRC did not show this in their **data which seems to make this report incomplete.**

4) TRC also did not identify any curly-leaf pondweed which was brought up in TASK 4 of their scope of work. Has this disappeared since the 2018 Solitude reporting of it in the lake?

5) I do not understand why there is no mention of using an eco-harvester machine. TRC is not an expert in harvester machines, the companies that use these are and have their reports to prove it. It would be beneficial to have a company that has done the whole East Coast to at least present to the town in a zoom meeting to tell you how it works. This would save the use of herbicides which most of us are against, the cost of continued use of herbicides which will eventually be at the cost of the residents, **(a point that the town neglects to tell the public),** and **most importantly, it would save any adverse effects to the food web from the critters in the lake to our river otters, ospreys, and bald eagles that eat the fish in our lake.**

Peter Spawn:

1. Do you consider sampling period to be representative of the past few years, and a good basis for overall conclusions and recommendations?
2. Stony Brook- if flash boards have disintegrated, then can't we replace them now and cut Phosphorous loadings?
3. Reducing flow from Stony Brook-
   a) Correct to assume a 50% reduction in flow result in roughly 50% reduction in P in lake?
   b) Will this action alone get lake to the P level needed to minimize weed growth?

b) Is there enough ground water/surface water to maintain lake levels?

4. ConCom's permitting goal is to protect habitat- I realize we did not do an big eco assessment.....regardless, do you have recommendations on how ConCom (and how DEP as well) can figure out what is best for lake habitat- e.g. weigh herbicide impacts on fish and invertebrates in the mud against any negative impacts of herbicides?
5. What do experts say about the impacts of the different herbicides on the food web? Does this stuff bio-accumulate and ultimately impact critters eating fish?
6. What, if any downstream impacts have been reported from herbicide application to other lakes? Are we impacting the Merrimack, or does the herbicide break down quick enough to have no measurable impact?
7. Have we/who should speak with the DEP lake person to determine their views on the study recommendations?
8. Please add some color to the TRC comment at the end of the public meeting- if costs were not a consideration, and maintaining food web was (is) top priority, would you recommend herbicide treatment of part, or all of entire lake?
9. What has happened to similar lakes that have been treated by passive methods, or herbicides, and what would you expect at Freeman?
10. Is there risk of cyanobacteria bloom with herbicide treatment?
11. If the 1993 report shows weeds about same as now, then is it reasonable to first work on P removal- with limited action at the beach.........
12. What sort of eco monitoring would you recommend for the herbicide option? Is it reasonable to apply some, and then monitor the impact before proceeding with annual applications?

Allen Beebe

Water Chestnut Hand Harvesting

Beginning in early June, weekly observations should be made at the priority water chestnut locations to look for growing plants. Collection activities could begin in late June or just after July 4th.

Since most of the water chestnut infestation areas adjoin Chelmsford Conservation Commission land, the Town DPW should consider providing town pickup trucks to be used to collect the harvested plants and transport them to a central offloading location. A recycling firm that accepts vegetation waste should be hired to remove all plants from this collection location to be composted.

I am preparing a short training video using video from my participation during a collection day hosted by OARS on the Concord River during late July 2023. The video provides information about the plant's life history, pulling the plants using canoes and laundry baskets and offloading on the shoreline. Wanda Dunn has offered to host a training session later this year where the video and further collection plans can be made.

Targeted herbicide treatments versus hand-pulling of Milfoil Plants

The three locations indicated for herbicide treatment are close to the lake's shoreline. Hand-pulling of the Milfoil plants would reduce overall impacts to other aquatic life in these locations including zooplankton, mussels, and fish. A team of two people, one with a mesh collection bag could pull the plants and the other person with a swimming pool net could collect fragments. Hand-pulling offers the potential to pull the rhizome root system as well as the stems. Local property owners all along the Freeman Lake shoreline could also use hand-pulling along their waterfront to improve water access. See attachment 1 for additional information.

Additional water sampling and flow analysis

More data about Phosphorus levels in Stony Brook and the upper end of the canal would enable a better understanding of Phosphorus loading in Freeman Lake. Samples could be collected at the dam and in the canal just downstream from the canal control gate. Just as an aside, a small brook empties into the canal just upstream from the TRC Meadowbrook Road sampling site. This small brook originates along Meadowbrook Road near Main Street, and flows under Dayton Street towards the canal, possibly providing another source of Phosphorus input.

Additional flow in both Stony Brook and the canal could complement the TRC flow data provided in their draft report. Apparently, another organization/agency was collecting flow/stream level data in Stony Brook during the same time as TRC. What is this organization/agency and how can this data be requested and examined? See attachment 2.

Benthic Barrier Study

Using a benthic barrier at Varney Park could indeed provide a useful control to limit the aquatic plant growth in front of the swimming area.

Peter Severance:

Flow conditions in the lake changed during the sampling season, where flow through the canal decreased and was no longer sufficient to maintain the flow of water over the spillway. This suggests that evaporation from the lake became a factor. Did this have an impact on the lake characteristics as represented in the data that was reported?

The report should list the flow numbers for the Stony Brook Diversion for 10 days prior to sampling, to capture inflow driven by recent rain events.

Quality Assurance problems: data which has clearly failed or is suspect per sample qa/qc procedures has been included in this report, affecting the analysis and conclusions of the report. The lab reports which describe these problems were included in Appendix A, however, the contractor was not forthcoming about these problems, and how they might affect the data and conclusions. I have detailed these problems below, and ask that the contractor provide explanations.

Since this report will be the focus of a regulatory hearing before the Chelmsford Conservation Commission under 310 CMR, analysis of the data should be presented in terms the MA Water Quality standards and regulatory classification of Freeman Lake. This discussion is lacking. In fact, in the case of Dissolved Oxygen and Temperature of this Class B warm-water fishery resource, the discussion provided references to year-round habitat for trout - implying – with no specifics - that cold-water fisheries standards apply to Freeman Lake and further, that such conditions would not be attained without lake management intervention. This is both incorrect and misleading. A proper discussion of the regulatory classification of Freeman Lake and how the water quality standards apply should be provided.

1. Quality Control / Quality Assurance questions

The following QA/QC issues were reported in Appendix A of the TRC report. They have bearing on the accuracy of the data presented and the conclusions drawn.

1.1 10/26/2023

Bottled laboratory (grab) samples not stored on ice, as per standard water quality sampling protocol. The samples collected at 14.6 C (58.3 F) but delivered to the lab at 23.6 C (74.5 F). The samples were thus possibly subjected to enhanced biological and chemical reactions that invalidate the reported results.

Page 75 of the report:

Page 3 of 15

Serial_No:10272320:20

Project Name:	FREEMAN LAKE	**Lab Number:**	L2363677
Project Number:	557159.0000.0000	**Report Date:**	10/27/23

Case Narrative (continued)

Sample Receipt

The samples were received at the laboratory above the required temperature range. The samples were delivered directly from the sampling site but were not on ice.

From page 80 of the report:

Serial_No:10272320:20

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2363677
Report Date: 10/27/23

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2363677-01A	Bacteria Cup Na2S2O3 preserved	A	NA		23.6	Y	Absent		F-COLI-MF(.33)
L2363677-01B	Bacteria Cup Na2S2O3 preserved	A	NA		23.6	Y	Absent		F-COLI-MF(.33)
L2363677-02A	Bacteria Cup Na2S2O3 preserved	A	NA		23.6	Y	Absent		F-COLI-MF(.33)
L2363677-02B	Bacteria Cup Na2S2O3 preserved	A	NA		23.6	Y	Absent		F-COLI-MF(.33)

The temperature at which the samples were delivered to the lab are SIGNIFICANTLY above the required temperature of samples stored on ice … in the vicinity of 4 deg C.

Also the lab duplicate test results for Ammonia and TKN showed a significant departure from the sample measures (pg. 172):

Biologically and chemically altered from conditions at the sampling sites.

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

November 10, 2023

QA/QC Data

SDG I.D.: GCP35678

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 704020 (mg/L), QC Sample No: CP35633 (CP35678, CP35679, CP35680)													
Alkalinity-CaCO3	BRL	5.00	22	22	NC	95.9						85 - 115	20
QA/QC Batch 704090 (mg/L), QC Sample No: CP35829 (CP35678, CP35679, CP35680)													
Phosphorus, as P	BRL	0.01	112	107	4.60	99.2			NC			85 - 115	20
Comment: Additional criteria matrix spike acceptance range is 75-125%.													
QA/QC Batch 703988 (mg/L), QC Sample No: CP35678 (CP35678, CP35679, CP35680)													
Nitrate-N	BRL	0.02	0.14	0.14	0	101			102			90 - 110	20
Nitrite-N	BRL	0.01	<0.010	<0.01	NC	94.0			103			90 - 110	20
QA/QC Batch 705475 (mg/L), QC Sample No: CP35263 (CP35678, CP35679, CP35680)													
Ammonia as Nitrogen	BRL	0.05	0.08	0.14	NC	104			106			90 - 110	20
Nitrogen Tot Kjeldahl	BRL	0.10	0.39	0.48	NC	97.2			100			85 - 115	20
Comment: TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller

Phyllis Shiller, Laboratory Director
November 10, 2023

1.2 4/16/24

The Phoenix Lab / QA/QC report is missing from Appendix A.

1.3 5/30/2024

Holding time for the Chlorophyll – a sample was exceeded. It's not clear whether this is a consultant's error or a lab error. This is from page 105 of the report:

Serial_No:06062415:34

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000
Lab Number: L2429838
Report Date: 06/06/24

Case Narrative (continued)

Sample Receipt

L2429838-02: The collection date and time on the chain of custody was 30-MAY-24 11:40; however, the collection date/time on the container label was 30-MAY-24 12:40. At the client's request, the collection date/time is reported as 30-MAY-24 11:40.

Chlorophyll A

L2429838-01 and -02: The sample was analyzed with the method required holding time exceeded.

WG1927850: A Laboratory Duplicate was not performed due to a laboratory oversight.

Coliform, Fecal (MF)

L2429838-03: The result is estimated due to the elevated concentration in the sample. Due to the expiration of the method required holding time, re-analysis could not be performed.

Also:

Fecal coliform – what was termed the acceptable hold times for Fecal colilform and E. coli? My experience is that the hold time for bacterial sample is usually 6 hours (can be longer for drinking water), but for L2429838-03, L2429838-04 and L2429838-05, it appears that this hold time was exceeded (~ 8 hrs, ~7.5 hrs, ~7 hrs, respectively).

1.4 6/26/24

Lab duplicate tests for TSS and Ammonia are borderline?

1.5 8/8/24

No issues.

1.6 10/2/24

Sample collection appears to have failed to follow QA protocols.

Laboratory reports and quality control procedures also report problems that are likely to affect these test results.

From Page 154 of the TRC Report:

Page 3 of 16

ALPHA ANALYTICAL

Serial_No:10092411:40

Project Name:	FREEMAN LAKE	**Lab Number:**	L2456877
Project Number:	557159.0000.0000	**Report Date:**	10/09/24

Case Narrative (continued)

Sample Receipt

The samples were received at the laboratory above the required temperature range and were not on ice.

Temperature of the samples should be kept as close to freezing as possible – usually, samples delivered at 3 or 4 deg C are acceptable. These samples were delivered at 17 deg C (page 160). This could lead to samples that were biologically and chemically altered from conditions at the sampling sites.

On page 159 of the TRC report, we see that the laboratories Duplicate Sample test – to assess the laboratories' ability to replicate its test results, failed:

Serial_No:10092411:40

Lab Duplicate Analysis

Batch Quality Control

Project Name: FREEMAN LAKE
Project Number: 557159.0000.0000

Lab Number: L2456877
Report Date: 10/09/24

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1979253-2 QC Sample: L2456877-02 Client ID: STATION 2						
Chlorophyll A	4.32	ND	mg/m3	NC		35

Canal and Stony Brook Stream Data Loggers

What organization/agency is collecting this data

Photo: 11/25/2023

Canal data logger just downstream of Canal Control Gate

Photo: 11/25/2023

Stony Brook Data Logger, just downstream of Canal Dam