



May 16, 2022

Emilie Cademartori  
Director of Planning & Conservation  
Lynnfield Conservation Commission  
55 Summer St  
Lynnfield, Massachusetts 01940

**Re: Initial Dredging Assessment of Pillings Pond  
Lynnfield, Massachusetts  
ESS Project No. 016193.0000.0000**

Dear Ms. Cademartori:

ESS Group, LLC (ESS) – A TRC Company – provides the Town of Lynnfield (Town) with this letter report describing the findings from the desktop and field assessments of Pillings Pond, in accordance with our August 12, 2021 proposal. This report also provides a basic description of potential dredging options and the next steps and associated costs for the Town's consideration.

## Desktop Assessment

### Setting and Description

Pillings Pond is an approximately 96-acre waterbody located within a few miles of Lynnfield center. The shoreline is primarily made up of residential properties. Public access to Pillings Pond is primarily through Rotary Park off Summer Street. Although there is no boat ramp, a small public parking area next to the park allows for limited cartop access.

Surface water enters Pillings Pond from the north via a small tributary (Bates Brook) that flows under Bourque Road. Water exits Pillings Pond at its southern end, where it flows under Summer Street to another basin, before discharging into the Reedy Meadow wetland complex downstream.

Pillings Pond is designated as a Class A waterbody pursuant to the Massachusetts Surface Water Quality Standards at 314 CMR 4.06(6). It is listed in the *Final Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle* as a Category 5 water, requiring a Total Maximum Daily Load (TMDL) for the following impairments: algae, chlorophyll a, dissolved oxygen, dissolved oxygen supersaturation, total phosphorus, and transparency/clarity.

### Lynnfield File Review

ESS visited the Lynnfield Town Hall on November 23, 2021 to review historical Pillings Pond documents and data provided by the Conservation Commission. Although these documents contained useful information for understanding the history of the prior dredging project and historical conditions of the pond, most were incomplete or of uncertain origin. Therefore, the utility for constructing a robust background of pond history is somewhat limited without further research. However, a brief summary of the relevant documents reviewed is provided in Table A below.



**Table A. Relevant Documents Reviewed**

Source	Year	Title/Description	Content/Relevance
Notice of Intent WPA Form 3	Various	Filings for dredging projects	Historic data on sediment dredging. Two filings were encountered: one for approximately 1,000 cy and another for 7,000 cy.
Various	Various 1978-1989	Various maps of pond	Information pertaining to bathymetry, sediment isopach and aquatic plants.
Carr Research Laboratory	1980	Lab report of sediment testing	Historic sediment data. Uncertain how it relates to specific locations in Pillings Pond.
N/A	From 1989-1996 period	Aerial photograph of pond during dredging operation	Shows extent of dredging operation
Toxikon Corp.	1990	Lab report of soil testing	Historic soil data. Uncertain how it relates to specific locations in Pillings Pond.
Various	1996-1999	Various correspondence between the Town, MassDEP, and US EPA	Correspondence regarding US EPA's cease and desist order to the Town, downstream releases, and site clean-up/restoration. The cease and desist order was issued in response to a finding that the Town had not obtained a Section 404 permit from the US Army Corps of Engineers, which is a required federal permit for all projects involving discharge of dredged and fill materials to waters of the United States.
Metcalf and Eddy	1998	Permitting Plan: Enhancement of Pillings Pond	Presents summary of prior dredging history and identifies a pathway for moving forward with additional dredging work. Figure 1 provides an overview of pond dredging to the date of the report, as well as proposed new sections to dredge.
Geosyntec	2009	Aquatic Plant Vegetation Assessment report	Discusses native and non-native aquatic plant species that observed in Pillings Pond in 2009.

**Other Relevant Information**

In addition to the file review, ESS conducted a brief desktop review of readily available information on Pillings Pond in the public domain.

Of particular use going forward are environmental resource designations and jurisdictions. These environmental resource designations and jurisdictions are important to understand because they may affect how future management actions are designed, permitted and/or implemented.

A summary of key designations is presented in Table B below.

**Table B. Environmental Resource Designations or Jurisdictions in Vicinity of Pillings Pond**

Designation/Jurisdiction	Present	Location(s)	Impact on Management Activities
Anadromous Fish Run	N	None	None anticipated
Area of Critical Environmental Concern	N	None	None anticipated
Coastal Zone	N	None	None anticipated
Coldwater Fisheries Habitat	N	None	None anticipated

Designation/Jurisdiction	Present	Location(s)	Impact on Management Activities
Estimated Habitat of Rare Wildlife	N*	Downstream	None designated in Pillings Pond but outlet flows into Reedy Meadow Conservation Area which is designated as estimated habitat of rare wildlife
Great Pond	N	None	None anticipated
Outstanding Resource Water	Y	Pillings Pond, its tributaries, and its outlet are designated as Outstanding Resource Waters.	Discharge of fill may be restricted or trigger additional review under state's 401 Water Quality Certification program.
Priority Habitat of Rare Species	N*	Downstream	None designated in Pillings Pond but outlet flows into Reedy Meadow Conservation Area which is designated as priority habitat of rare species (PH 1637)
Surface Water Protection Area	Y	Pillings Pond, its tributaries, and its outlet are designated as a Zone A Surface Water Protection Area.	See Outstanding Resource Water.
Wellhead Protection Area	N	None	None anticipated
Wetland Resource Area	Y	Resource areas present in and near Pillings Pond. Examples include Land Under Water, Inland Bank, Riverfront Area, and Buffer Zone.	Order of Conditions from the Lynnfield Conservation Commission required to undertake management actions in or near resource area. This would include pond dredging.

\*Not located within footprint of Pillings Pond

## Field Assessment

### Approach

ESS visited Pillings Pond on March 23, 2022, to conduct a bathymetry and bottom type survey at the pond. Prior to the field assessment, a survey grid was created in GIS, dividing Pillings Pond into approximately 50 grid cells. Water depth measurements were collected from a boat using a handheld depth echosounder, with at least one measurement in each grid cell to ensure geographic coverage of the pond. Additional locations were added in areas of irregular bathymetry to help capture field-observed features, as determined by the field crew. The water level relative to the pond spillway was measured to obtain water depth at normal pool elevation. Information regarding substrate type (i.e., muck, sand, cobble, boulder, etc.) was also recorded at each location where depth measurements were taken. All positions and associated data were recorded using a handheld GPS.

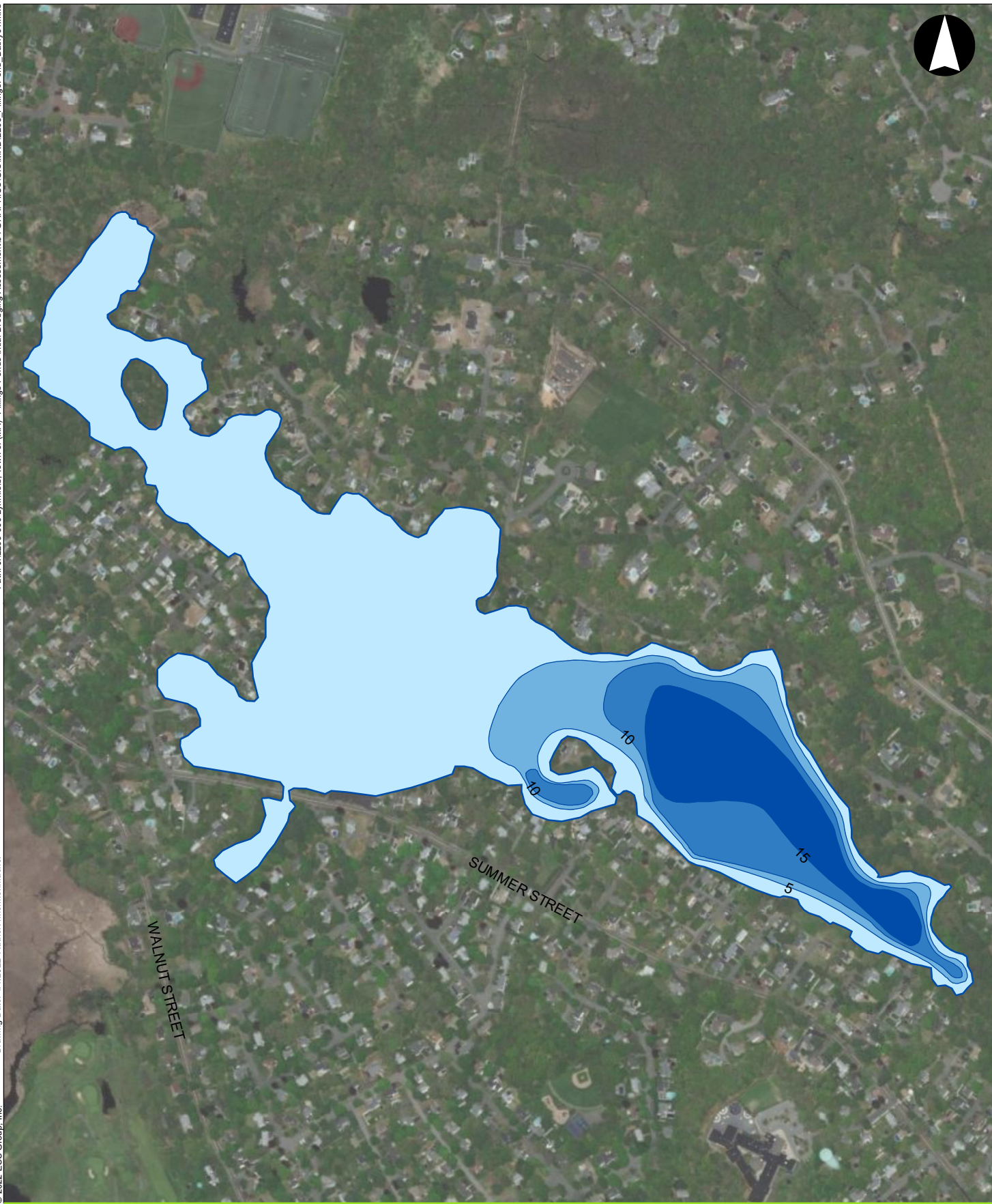
### Results

The southeastern half of Pillings Pond was found to have greater water depths, reaching more than 15 feet (Figure 1). The greater water depths in this area are not surprising, given that this is where the

pond was dredged in the 1990s. Water depths elsewhere were shallow, typically less than five feet. However, water depths in the northwestern extreme of the pond, as well as the areas adjacent to the large island were very shallow, generally one foot or less.



*Historical imagery of Pillings Pond. **Top.** The active dredging operation is clearly visible in the southeastern half of the pond from this 1995 orthophotograph. Source: Google Earth. **Bottom:** Aerial view of dredging at Pillings Pond from an undated oblique aerial photograph. View is from southeast looking toward the northwest. Source: Anonymous.*

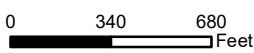


**Assessment of Pillings Pond**  
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**Bathymetry**

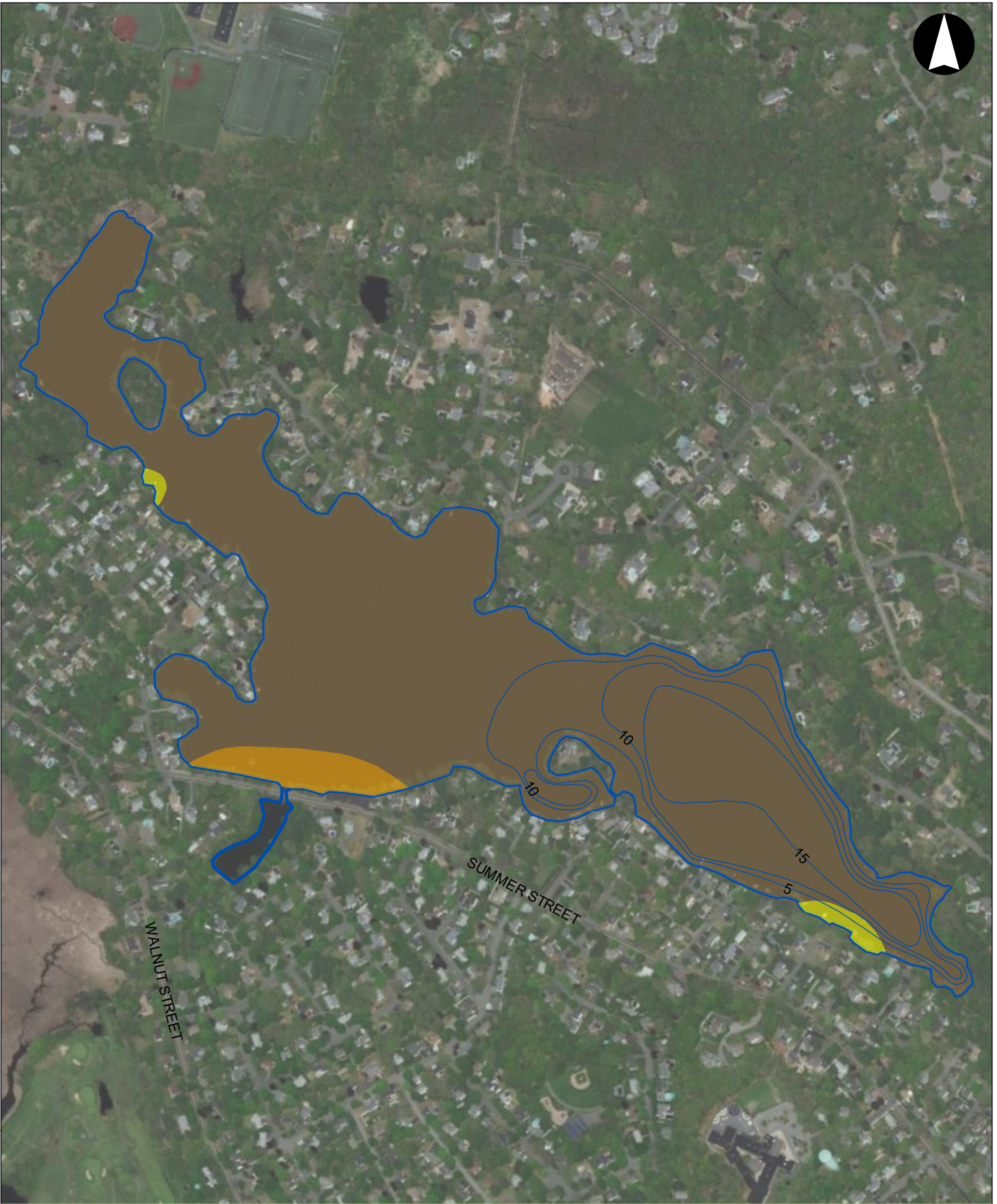


— Bathymetry Contours (5 Ft. Intervals)



Source: 1) ESRI, World Imagery, 2020  
2) ESS Group, Bathymetric Data, 2022

**Figure 1**



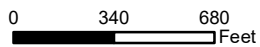
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**Substrate Type**



- Coarse (3.5 Acres)
- Muck (94.3 Acres)
- Sand (1.2 Acres)
- Bathymetry Contours (5 Ft. Intervals)

Source: 1) ESRI, World Imagery, 2020  
2) ESS Group, Bathymetric Data, 2022



The vast majority of substrate in Pillings Pond appeared to consist of fine organic muck or silt (Figure 2). Areas of exposed sand and coarse substrates (gravel, cobble, and boulder) were primarily confined to the northwestern shoreline and the area near Rotary Park. However, it is likely that these coarse sediments are more extensive below the surface substrate.

## Dredging Options

Dredging can be accomplished using a conventional “dry” dredge approach, or through wet excavation or hydraulic dredging.

Dry dredging requires drawdown of the pond to allow sediment dewatering and the use of conventional excavation equipment. The outlet of Pillings Pond located on Summer Street appears to allow some level of water level control by means of a stop-log control system. This type of control system may allow for the pond to be drawn down, which would be helpful if conventional “dry” dredging was the desired dredging method. Typically, conventional dry dredging is best completed during the winter months when cold temperatures enhance access for dredging equipment and make for improved handling of excavated sediments. This is particularly true in cases where fine sediments account for a large portion of total material. Additionally, the reduced metabolic activity of wetland and aquatic organisms at this time of the year reduces stress from dredging disturbance.

Wet excavation is not likely to be a viable option for a large-scale dredging project at Pillings Pond. However, if conventional dry dredging is not feasible due to drawdown restrictions or other limitations, hydraulic dredging may be considered as a potentially viable alternative.

Hydraulic dredging is generally more expensive than dry dredging but becomes increasingly cost-effective as the scale of a project increases. Hydraulic dredging requires significant planning for the dewatering of the sediment since the approach typically produces a sediment slurry that is 80 percent water or more. Removing this volume of water from the sediment requires either a more sophisticated containment area or advanced dewatering techniques. Each of these approaches may add costs over traditional dewatering. Regardless of the sediment dewatering option selected, a substantial acreage of land adjacent to or near the pond is required for the dewatering process.



*The spillway at Pillings Pond. A stoplog system appears to allow for some level of drawdown. However, deeper drawdown may require coordinated dewatering of the basin just downstream. This would need to be evaluated further to pursue a conventional “dry” dredging project.*

Dredging costs vary greatly depending on the quantity and quality of material to be removed, the disposal site, and the type of dredging selected. However, costs for dredging and disposal alone could be expected to range from \$40 per cubic yard to more than \$100 per cubic yard. This means that even a relatively modest dredging project could be expected to cost hundreds of thousands of dollars. Therefore, the first step to any pond dredging project is to complete a dredging feasibility study. This will help to vet the project’s viability and identify potential roadblocks or pitfalls before entering the more costly and extended design, permitting, and implementation phases.



The dredge feasibility study would typically include the following, although additional tasks may also be appropriate:

- Identify initial community goals and priorities for the dredging project
- Map soft sediment thickness in portions of the pond that are of potential interest for dredging
- Collect sediment cores to assess the physical characteristics and chemical quality of the sediment in targeted portions the pond
- Evaluate the general options for reuse or disposal based on the sediment testing results
- Assess options for ingress and egress of equipment as well as dewatering and stockpiling of material
- Provide an initial timeline and estimate of costs for project design, permitting, and implementation

If determined to be feasible, the project would then proceed to the engineering design and permitting phase. Environmental permitting for dredging projects is moderately complex and typically requires a year or more before the project receives all required approvals. Federal, state, and local permits or approvals are all required, and would necessitate considerable advance information and review time. A dredge feasibility study for Pillings Pond could likely be completed for \$35,000 to \$50,000, depending on the scope and amount of sampling requested.

Thank you for the opportunity to support the Town of Lynnfield with this initial dredging assessment of Pillings Pond. If you have any questions, please contact the undersigned at 781.419.7742.

Sincerely,

**ESS GROUP, LLC**

A handwritten signature in black ink that reads "James Treacy".

James Treacy  
Staff Scientist