Warner's Pond Restoration Alternatives
Community Meeting #1

Prepared for:

THE TOWN OF CONCORD MASSACHUSETTS

Prepared by:

EA Engineering, Science, and Technology, Inc., PBC

March 2, 2023

Presentation Overview

- What's Going on with Warner's Pond?
- Warner's Pond Background
- Restoration Concept and Goals
- Restoration Alternatives
- Next Steps

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What's Going On With Warner's Pond?

The Town of Concord has partnered with EA to complete an analysis of alternatives to restore the ecological, recreational, and community functions and values of the Warner's Pond/Nashoba Brook system.

This alternatives analysis is being undertaken to provide information to the Town, its residents, and other stakeholders regarding the pros and cons of the alternatives under consideration. This information is intended to assist in the Town's decision-making process.

Obtaining feedback from the community is a critical aspect of this process.

The scope of this analysis includes three alternatives: dredging and relocation, dam removal, and no action.

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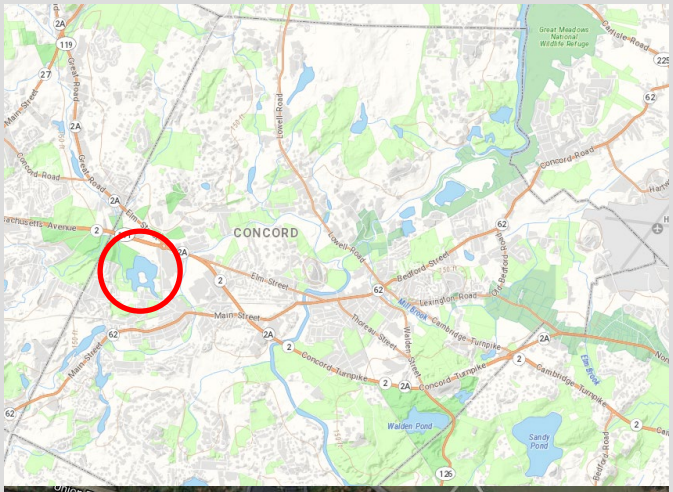
Warner's Pond Background

- Located in West Concord
- Created in current form in 1857 by damming Nashoba Brook
- 54 acres in size, including 3 islands that total ±7.5 acres
- Maximum depth ±12 feet, most of the pond is 5 feet or less
- The Town owns the pond, its dam, and three access locations along the shoreline of the pond, including Gerow Recreation Area
- Recently-constructed Bruce Freeman Rail Trail (BFRT) passes by the northern pond edge



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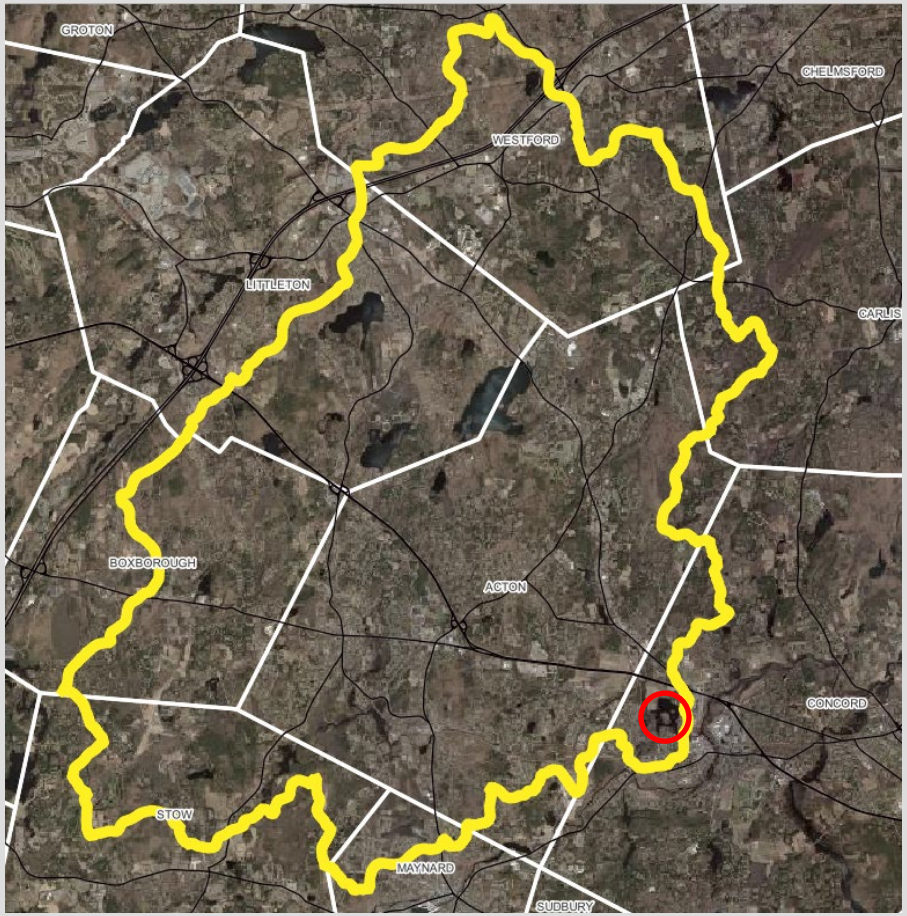
Warner's Pond Background

- **Pond has undergone eutrophication since at least the 1980s**
  - Excessive plant growth fueled by high nutrient levels → loss of open water
- **Dense growths of multiple aquatic invasive species (Apr. vs. Jun.)**
  - Impaired recreational value and aesthetics
  - Degraded habitat
  - Reduced water quality
- **Listed as "Impaired" by DEP due to aquatic invasives**
- **Accumulation of nutrient-rich sediment reducing water depths**
  - Phosphorus (P) is the nutrient that fuels plant growth – it is contained in pond sediments and dissolved in the water column

Past Studies & Management

- **1983 – MassWildlife fisheries survey**
- **1999 – Warner's Pond Management Plan**
- **1999-Present – Aquatic plant management**
- **2011 – Follow-up aquatic plant survey**
- **2012 – Watershed Management Plan (WMP)**
  - Average phosphorus (P) loading to Warner's Pond is 5.4 tons/year
  - Permissible load for P is 0.4 tons/year and critical load is 0.9 tons/year
  - Thus, average P load is over 6x higher than critical load
  - Even if 80% reduction in P load to Warner's Pond could be achieved, in-pond levels would remain well above critical load
  - Options for long-term management considered in WMP were:
    - (1) watershed-based approaches and
    - (2) sediment removal through dredging

Cause of the Problem



Warner's Pond watershed (in yellow) is 47 square miles and located almost entirely outside of Concord. The watershed-to-pond size ratio is 612:1.

The impounding effect of the pond's dam traps sediment in the pond and prevents it from moving downstream.

Issues caused by interaction of two factors

Dredging Project Outcome

- **2018 – Dredge Feasibility Study**
  - Watershed-based approaches deemed infeasible to implement at a scale likely to provide a meaningful benefit
  - Limited dredging project designed to remove 35,000 cy of material (over 6 acres)
- **2022 – Permits secured for dredging project; out to bid**
  - One bid received, cost was significantly higher than 2022 cost estimates and appropriated funding
  - Large driver of cost was related to establishing dewatering area next to pond and transporting dredged material to off-site location
- **How can restoration project move forward?**
  - Reduce costs for dredging by keeping material in pond
    - Cost reduction may come with commensurate reduction in scale of benefits
  - Other alternatives not considered previously?
    - Dam removal

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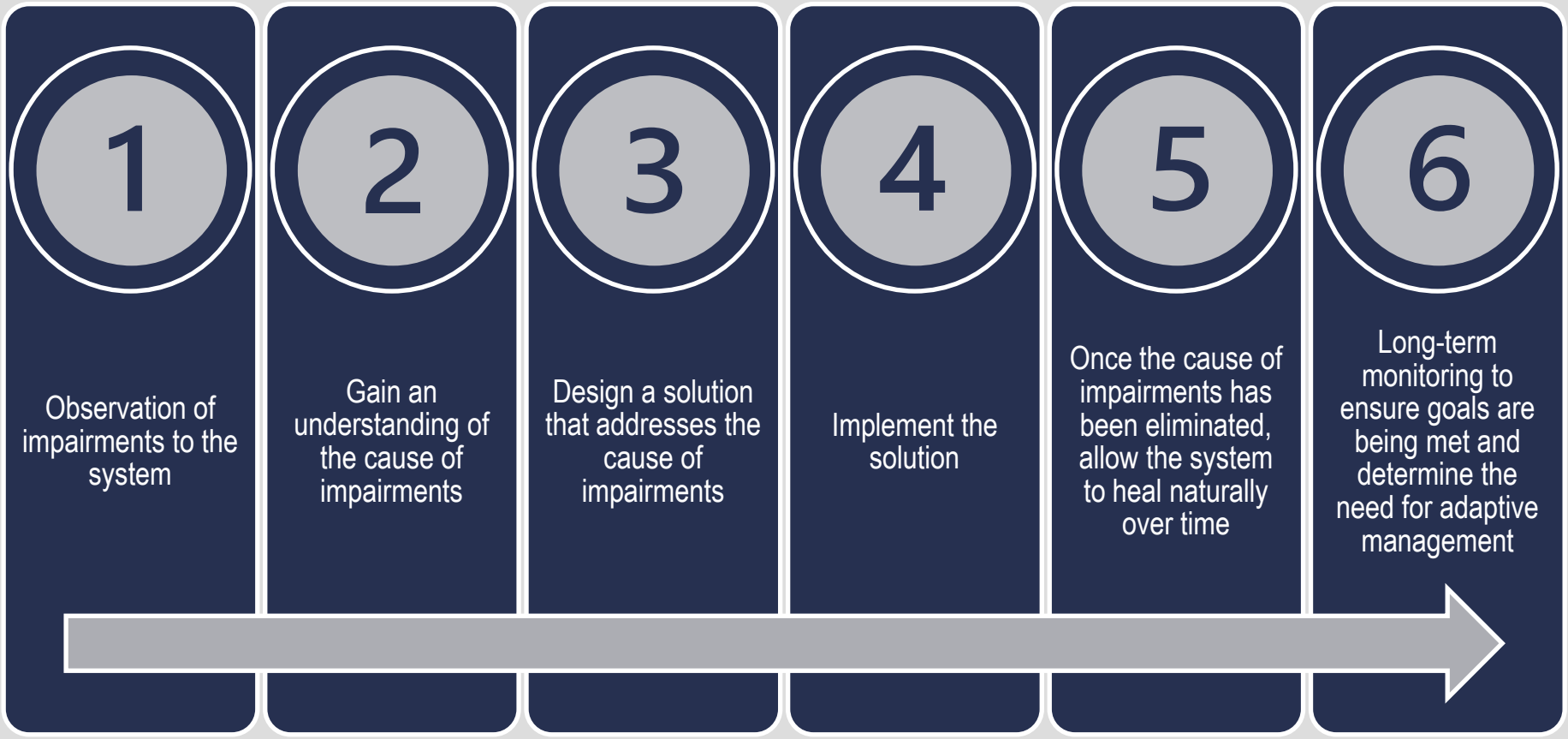
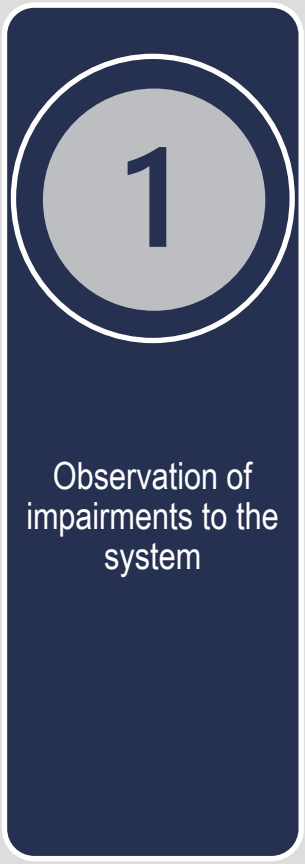
Restoration Concept



Goal is to restore the natural processes that allow the system to provide ecological, recreational, and community functions and values without the need for continuous interventions.

Restoration Concept



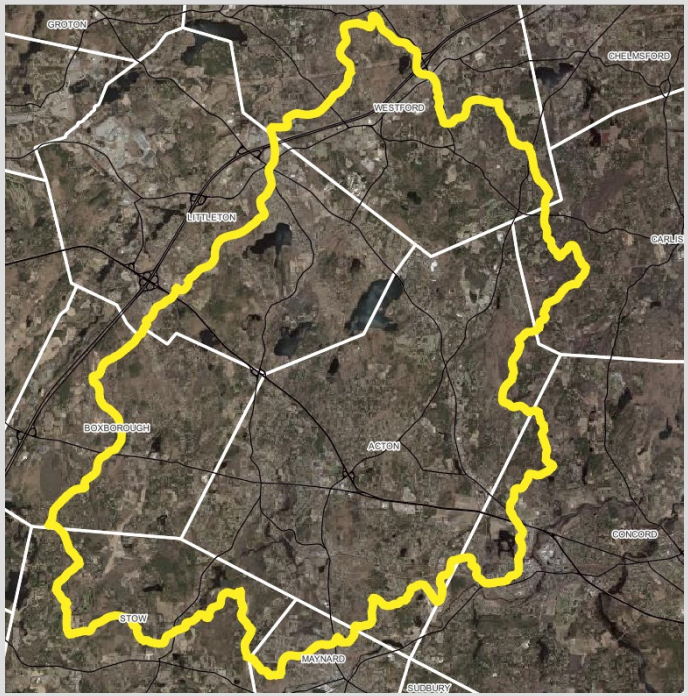
- **Reduced water depths** – degraded habitat for fish and wildlife and impaired recreational opportunities
- **Extensive growths of aquatic invasive species** – degraded habitat for fish and wildlife and impaired recreational opportunities
- **Restriction of movement of aquatic organisms,** including loss of habitat and connectivity for diadromous fish populations
- **Risks to public safety and property** associated with potential for dam failure
- **On-going costs** associated with inspection, maintenance, and repair of dam

Restoration Concept

2

Gain an understanding of the cause of impairments

- Sediment and nutrient loading from watershed
- Sediment accumulation in pond sediments
- Presence of dam



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Restoration Concept

3

Design a solution that addresses the cause of impairments

- **Ecological Goals**
  - Enhance habitat for native fish and wildlife
  - Manage aquatic invasive species
  - Improve water quality
- **Recreational Goals**
  - Enhance recreational infrastructure and accessibility
  - Increase opportunities for paddle craft use and recreational fishing
  - Provide water-based recreational opportunities at Gerow Park
- **Community Goals**
  - Enhance climate resilience
  - Protect public safety
  - Minimize long-term operation and maintenance costs

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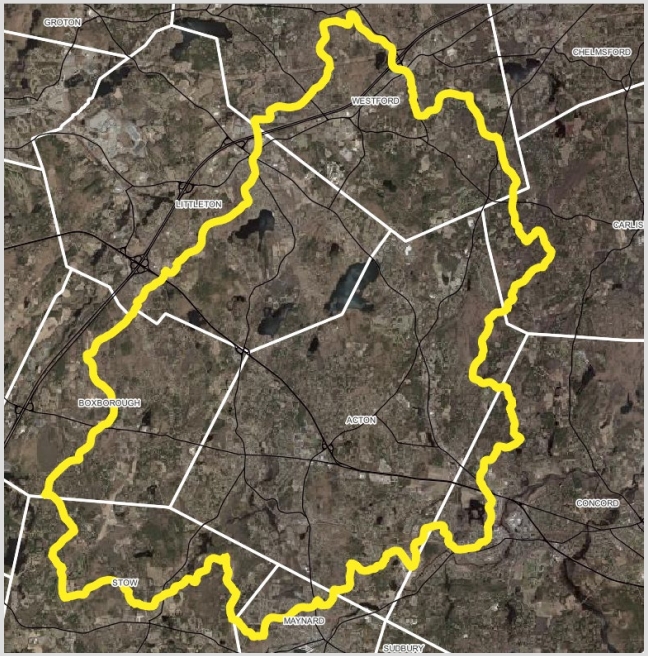
Alternatives Context

- **Impairments due to:**
  - **Sediment and nutrient loading from watershed**
    - Average P load is over 6x higher than critical load
  - **Sediment accumulation in pond sediments**
    - Even if 80% reduction in P load to Warner's Pond could be achieved, in-pond levels would remain well above critical load
  - **Presence of dam**
    - The impounding effect of the pond's dam traps sediment in the pond and prevents it from moving downstream.



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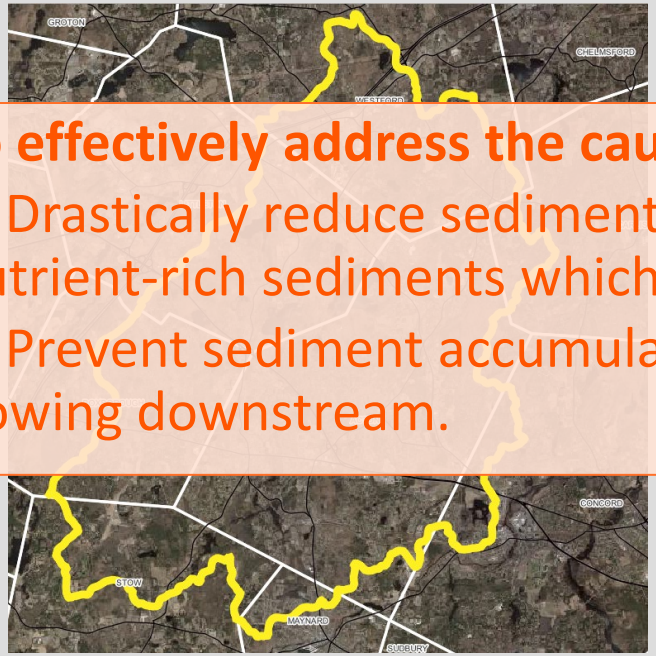

To effectively address the cause of impairments, restoration must:

1. Drastically reduce sediment/nutrient loading to the pond and remove nutrient-rich sediments which have already accumulated in the pond –OR–
2. Prevent sediment accumulation by removing the barrier to sediments flowing downstream.

Possible Alternatives

- **Aquatic plant management (herbicides, harvesting, hydroraking, drawdown)**
  - Does not address fundamental problem
  - Long-term commitment
  - Pond characteristics likely to limit effectiveness
  - Potential non-target impacts
  - Can exacerbate invasive aquatic plant growth
- **Dredging (with sediment removal)**
  - Too costly
- **Dredging (with sediment relocation)**
- **Watershed-based approaches**
  - Logistically and economically infeasible
  - Would not address nutrients already in the pond
- **Dam removal**
- **No action**

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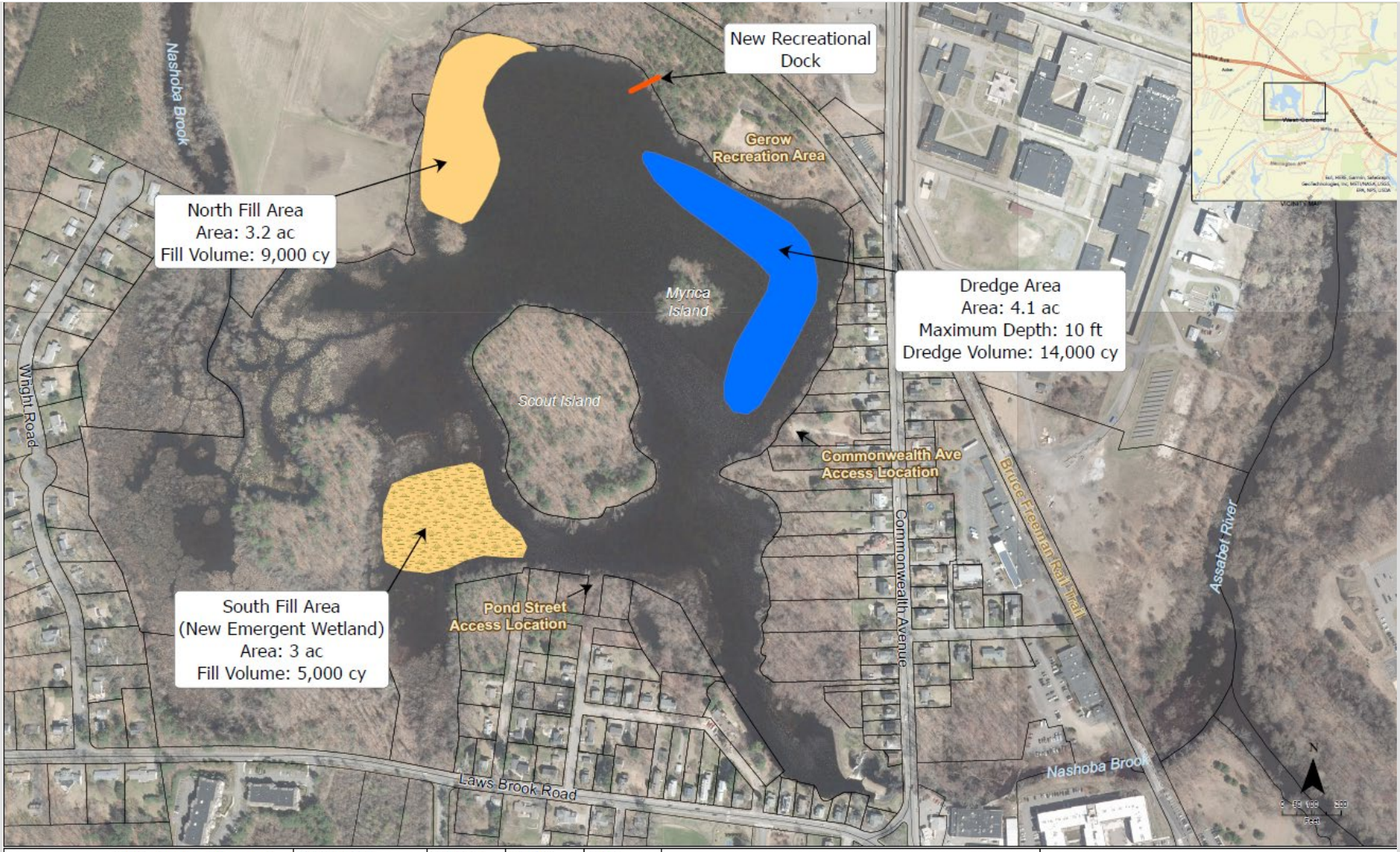
Dredging + Relocation – Overview

- **Dredging**
  - Focus on area between Gerow and Commonwealth Ave. access location
  - Dredge volume constrained by available budget and room to store dredged material elsewhere in pond basin
  - Dredge area ±4.1 acres, max. depth ±10 ft, dredge volume ±14,000 cy
- **Relocation**
  - Northwestern shoreline
    - Fill area ±3.2 acres, fill volume ±9,000 cy
  - Southwestern cove
    - Fill area ±3 acres, fill volume ±5,000 cy
    - Area would be converted to shallow emergent marsh
- **Recreational improvements**
  - Recreational dock at Gerow
  - Access improvements at Commonwealth Ave.

Dredging + Relocation – Conceptual Drawing



EA Engineering, Science, and Technology, Inc., PBC 301 Metro Center Blvd, Ste 102 Warwick, RI 02886	PROJECT NUMBER: 6392901	DESIGNED BY: AH	DRAWN BY: QM	FIGURE: 2	WARNER'S POND RESTORATION ALTERNATIVES ANALYSIS CONCORD, MASSACHUSETTS, 01742	DREDGING AND FILLING ALTERNATIVE
	DATE: FEBRUARY 2023	CHECKED BY: AP	PROJECT MGR: AP	SHEET NUMBER: 1		

THE TOWN OF CONCORD MASSACHUSETTS

Dredging + Relocation – Visual Rendering

Dredging + Relocation – Pros and Cons

Pros

- Positive impact on recreational opportunities by providing deeper water connection between access locations and reducing aquatic invasive plants
- Establish 3 acres of new vegetated wetlands in pond's southwestern cove
- Potential benefit to WQ through decreased water temperature and increased DO in dredged area; may be offset by negative impacts to WQ in relocation areas
- Potential benefit to fish habitat due to WQ improvements

Cons

- Temporary increase in suspended solids due to dredging and filling operations
- Direct mortality of shellfish and benthic organisms; impacted areas expected to be recolonized and no rare species known to occur
- Destabilization of subaqueous sediments
- Scale of dredging relatively small due to cost constraints and limited relocation areas available in pond
- Logistical challenges
- Benefits may ultimately be marginal in relation to project cost
- Not a permanent solution – dredge area will eventually re-fill with sediment

Dredging + Relocation – Conceptual Costs

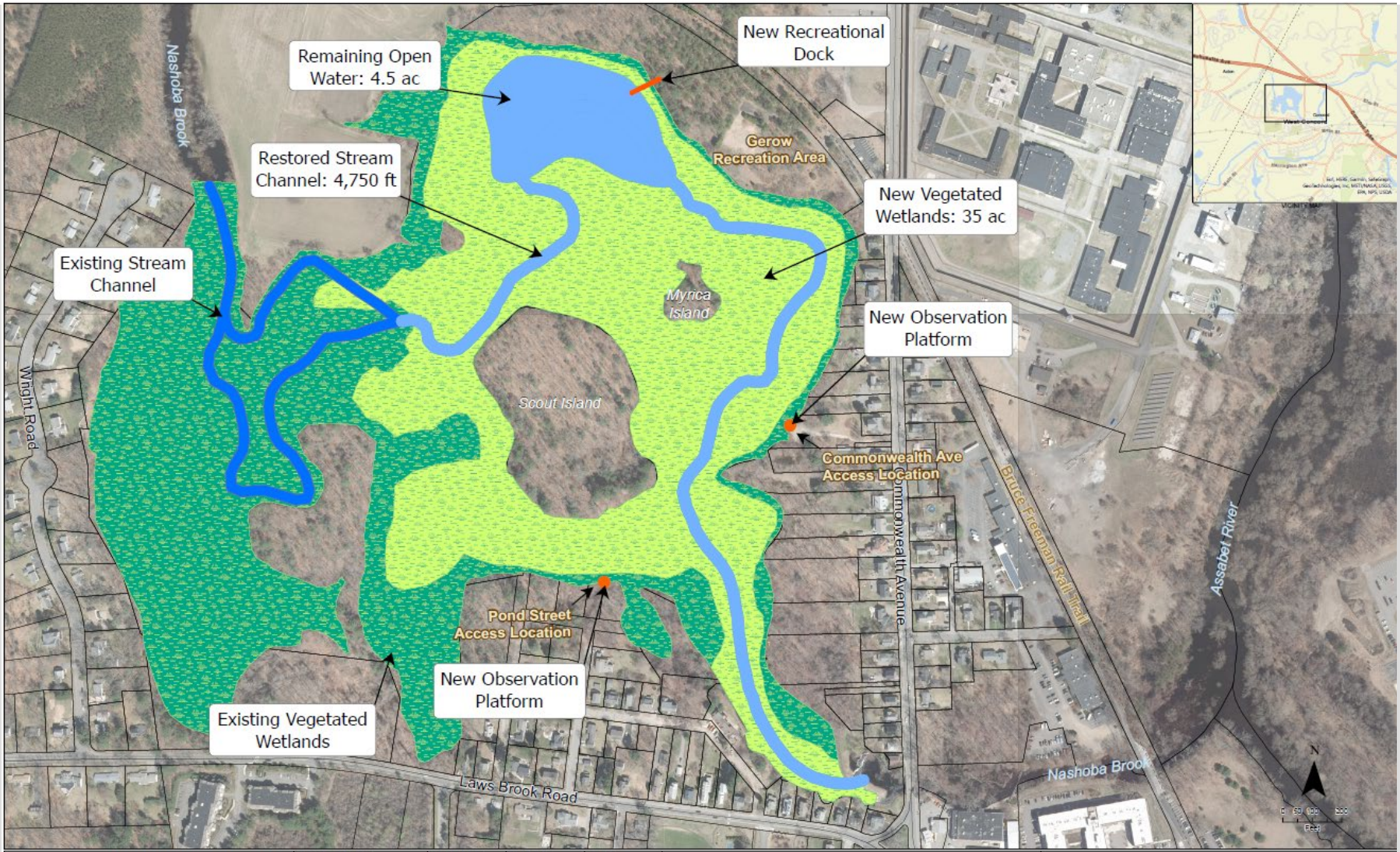
Project Phase	Cost Estimate	Low Range (-15%)	High Range (+30%)
Detailed Data Collection and Analysis	$40,000	$34,000	$52,000
Preliminary Engineering Design	$35,000	$29,750	$45,500
Federal, State, and Local Permitting	$75,000	$63,750	$97,500
Final Engineering Design and Contract Preparation	$45,000	$38,250	$58,500
Project Implementation*	$2,390,000	$2,031,500	$3,107,000
Post-Construction Monitoring and Adaptive Management	$40,000	$34,000	$52,000
Project Total	**$2,625,000**	**$2,231,250**	**$3,412,500**

*includes 20% construction contingency

Dam Removal – Overview

- **Stream and wetland restoration**
  - ±4,750 feet of stream channel restored
  - Channel ±40 ft wide – similar to upstream and downstream reaches
  - ±35 acres of new wetlands re-established
  - ±4.5 acre open water area anticipated to remain at pond's deep hole
- **Recreational improvements**
  - Recreational dock at Gerow
  - Observation platforms at Commonwealth Ave and Pond Street
- **Monitoring and adaptive management**
  - Planting/seeding, live fascines, large wood in stream
  - Invasive species management (primarily purple loosestrife)
  - Opportunities for long-term study of system response to dam removal

Dam Removal – Concept Drawing



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Dam Removal – Concept Drawing

Dam Removal – Visual Rendering

Dam Removal – Pros and Cons

Pros

- Very significant benefit to wildlife habitat through creation of ±35 acres of new wetlands
- Restoration of aquatic life movement through Nashoba Brook and the Assabet River, including diadromous fish passage
- Widespread elimination of aquatic invasive species by removing suitable habitat
- Recreational benefits through improved paddling and fishing opportunities
- Water quality improvements by restoring natural flow patterns
- Eliminate safety/infrastructure hazard
  - Port-a-dam failure during dam reconstruction
- Potential benefits to flood control by reducing extent of 100-year floodplain
- Costs may be largely offset by securing grant funding from federal/state sources

Cons

- May or may not be negative effects depending on personal preference:
  - Significant reduction in the size of open water area
  - Changes in visual characteristics
  - Changes in recreational opportunities – no water access from Commonwealth Avenue
- Short- to medium-term negative impact on shellfish habitat through removal of the impoundment. Mussels expected to recolonize restored stream channel; no rare species known to occur in pond

Dam Removal – Conceptual Costs

Project Phase	Cost Estimate	Low Range (-15%)	High Range (+30%)
Detailed Data Collection and Analysis	$50,000	$42,500	$65,000
Preliminary Engineering Design	$65,000	$55,250	$84,500
Federal, State, and Local Permitting	$75,000	$63,750	$97,500
Final Engineering Design and Contract Preparation	$50,000	$42,500	$65,000
Project Implementation*	$2,183,000	$1,855,550	$2,837,900
Post-Construction Monitoring and Adaptive Management	$100,000	$85,000	$130,000
Project Total	$2,523,000	$2,144,550	$3,279,900

*includes 20% construction contingency

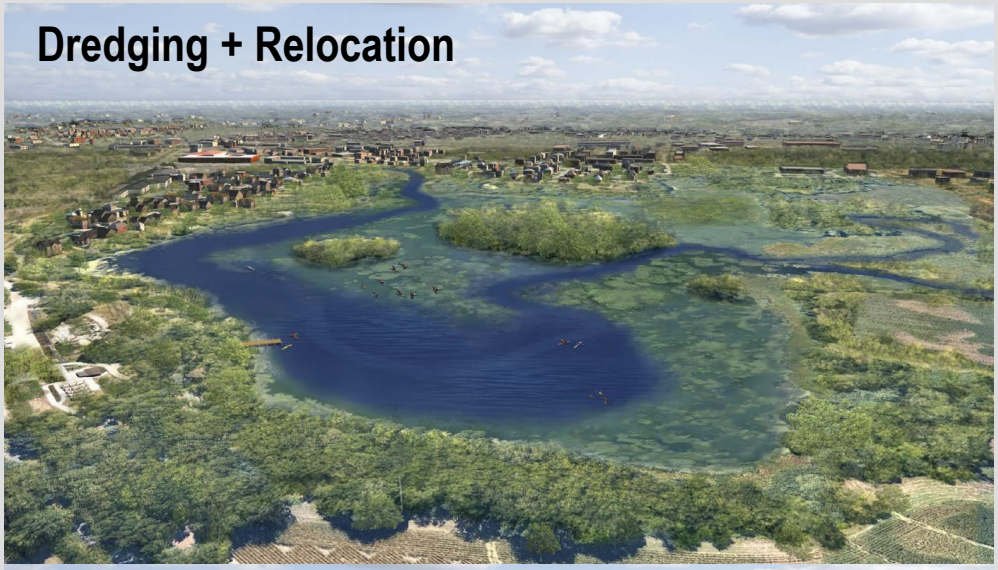
Dam Removal – Conceptual Costs

Significant sources of federal and state funding are available to offset the costs dam removal projects.

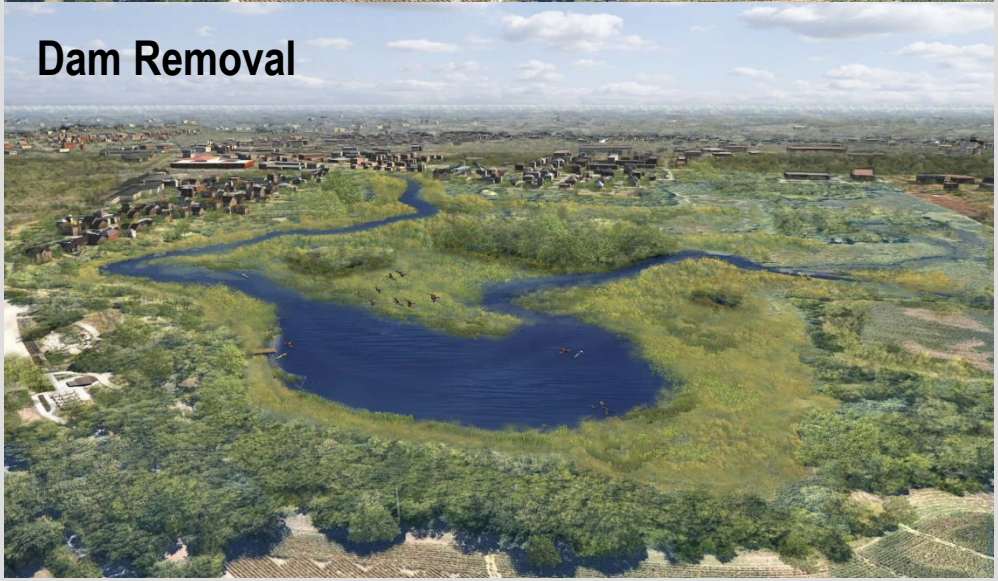
- Massachusetts Division of Ecological Restoration (DER) Priority Projects
- Massachusetts Municipal Vulnerability Preparedness (MVP) Action Grants
- Massachusetts Dam and Seawall Repair or Removal Program Grants
- EOEEA Massachusetts Environmental Trust (MET) Grants
- NOAA/American Rivers Community-based Restoration Program River Grants
- NOAA Restoring Fish Passage through Barrier Removal
- NFWF New England Forests and Rivers Fund
- USFWS National Fish Passage Program

Conceptual Renderings Side-by-side

Dredging + Relocation



Dam Removal



Example of wetland habitat similar to that expected following relocated dredge material (from GMNWR)

Example of wetland habitat similar to that expected following dam removal

No Action

- Maintains status quo in the short term
- In medium- to long-term, conditions in Warner's Pond expected to continue to deteriorate
- Ability of the pond to provide ecological, recreational, and community benefits continues to decline
- Shallow areas will transition to vegetated wetlands, deeper areas will become shallower
- Primary benefit is avoiding costs associated with action alternatives
  - Town would continue to incur costs associated with maintaining, inspecting, and repairing dam

Warner's Pond - August 2022

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Next Steps

- Alternatives Analysis Report to be finalized in spring 2023
- Second community meeting to discuss findings and solicit feedback
- Selection of a preferred alternative
- Advance project design, permitting, and implementation

TAKE THE SURVEY!

Responses received by March 15 at 5:00 pm will be included in the Alternatives Analysis Report

https://www.surveylegend.com/survey/-NNc5NhB4UnuN0JWRtkK

Thank You!

TAKE THE SURVEY!

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