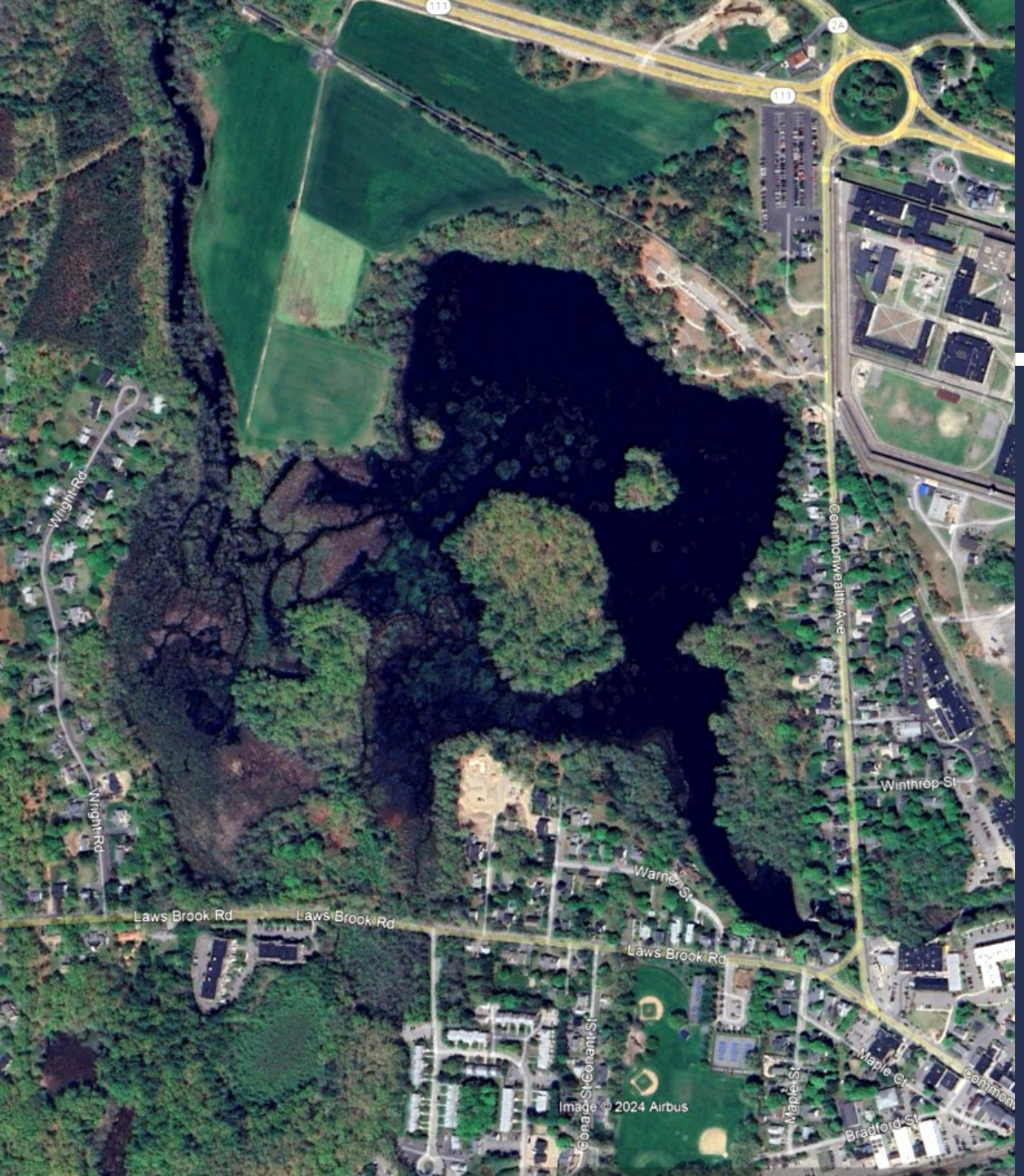

Warner's Pond Task Force Meeting | July 18, 2024

Prepared for:

THE TOWN OF CONCORD MASSACHUSETTS

Prepared by:

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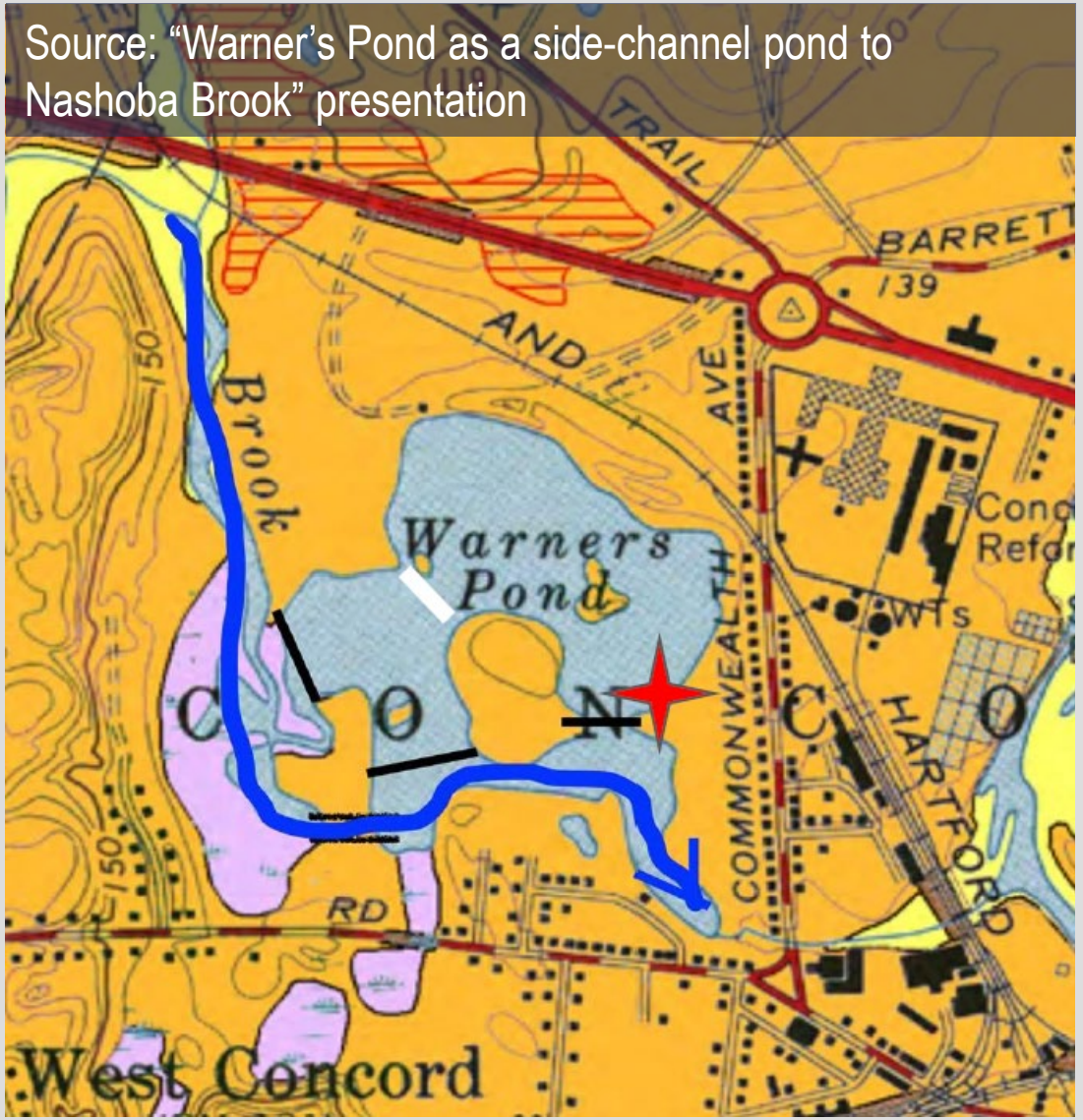
July 18, 2024

INTRODUCTION

- EA was asked to:
  - Review the slide presentation entitled *"Warner's Pond as a side-channel pond to Nashoba Brook"* prepared by Anna Feldweg, MD and John Colman
  - Provide our assessment of this concept with respect to the following topics:
    - Engineering considerations and constructability
    - Ecological considerations
    - Regulatory feasibility
    - Cost
    - Potential for unintended negative outcomes

PROJECT UNDERSTANDING

- This concept entails the construction of a series of berms across Warner's Pond and it's bordering vegetated wetlands to cause Nashoba Brook to bypass Warner's Pond.
- The stated reason for this activity is to reduce inputs of sediment and nutrients to Warner's Pond from Nashoba Brook.
- The presentation states that berms would be created using material dredged from Warner's Pond.



ENGINEERING CONSIDERATIONS & CONSTRUCTABILITY

- ***Material dredged from Warner's Pond would require extensive handling, dewatering, and amendments to provide the material strength necessary to be formed into berms*** with the ability to withstand the sustained forces of Nashoba Brook during normal flows and storm events.
- ***The volume of material necessary to construct berms may not remove a significant amount of sediment from pond***.
  - Assume berms have a trapezoidal shape with a 2:1 side slope angle, 10 ft top width, ~40 ft bottom width, height 2.5 ft above existing water surface, and combined length of 750 ft.
  - Total estimated volume of material for berm construction is about 5,400 CY
  - This would necessarily include amendments to the pond sediment

ENGINEERING CONSIDERATIONS & CONSTRUCTABILITY

- ***Dam breach would be necessary*** to avoid creating a new reservoir in the non-isolated portion of Nashoba Brook, potentially resulting in flooding impacts to properties to the west and south and converting existing vegetated wetlands to open water.
- ***Dredging and berm construction would require complex water management.*** Berm construction would require cofferdam installation. Dredging could be done hydraulically, but material would require dewatering and amending outside the pond basin. Access through the pond could be challenging due to the extensive mucky sediments. Extensive swamp matting would be required. The complex dewatering and construction access requirements would increase project costs.
- ***Channel and bank armoring with riprap may be needed to protect the berms and adjacent shorelines from erosion.*** The same volume of water will now be moving through Nashoba Brook in a much smaller floodplain, thus increasing velocities.

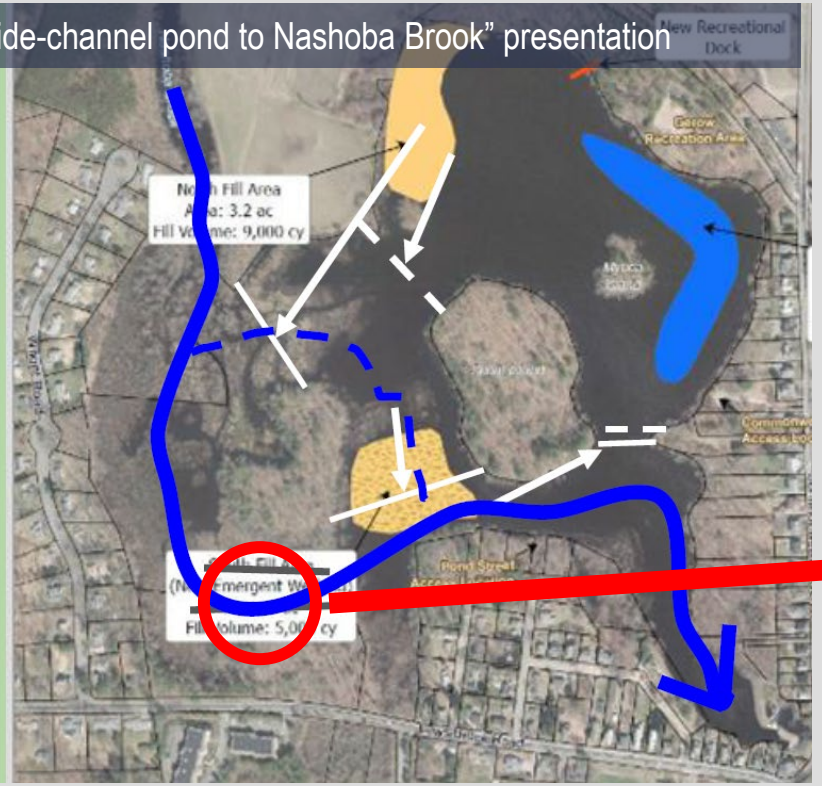
ENGINEERING CONSIDERATIONS & CONSTRUCTABILITY

- Since the primary flow path of Nashoba Brook is through Warner's Pond, it is not clear that the brook would necessarily flow effectively along the desired pathway after berms are built. ***Excavation or dredging through uplands and wetlands southwest of the pond would likely be required to establish the new channel*** alignment and prevent ponding and erosion on the berms.

Source: "Warner's Pond as a side-channel pond to Nashoba Brook" presentation

Proposal: Use the limited dredging option, but move the fill as shown by the white arrows to the positions of the solid white lines, which would separate the stream from the pond.

Alternative locations for fill islands are indicated by dashed white lines (in which case water flow would be in dashed blue.)



ECOLOGICAL CONSIDERATIONS

- ***Extensive water management and cofferdam installation necessary during construction could negatively impact fish and wildlife in the pond.***
- While the presentation asserts that water quality in the newly isolated pond would be "good," in our view, ***there is a strong likelihood that water quality in the newly isolated pond could be significantly degraded*** compared to current conditions. Stagnation caused by lack of flushing could cause dissolved oxygen (DO) levels to decline and temperatures to rise, potentially creating toxic conditions for fish and other aquatic life and possibly leading to fish kills and algae blooms.
- In most watersheds, septic system inputs are not the primary source of nutrients. ***Internal nutrient cycling as well as nutrient inputs to the pond would continue*** to support aquatic plant growth and degrade water quality.
- ***We question the assertion that groundwater inputs and precipitation would maintain water levels in the pond*** to anything close to current conditions (see slide 10).
- ***Overall, the concept may entail significant risk for negative impacts to water quality, fish and wildlife habitat, and other ecological functions.***

REGULATORY FEASIBILITY

- ***Based on our professional experience, there is little to no regulatory pathway for this project.***
- Massachusetts has some of the strictest environmental and wetlands regulations in the country, which may differ from other jurisdictions where similar projects have been completed in the past.
- The project would most likely not be eligible for review as an ecological restoration project and would therefore require a Variance from the Massachusetts Wetlands Protection Act (WPA) due to the degree of impact to resource areas. The WPA regulations establish a very high standard for receiving a Variance:
  - No reasonable alternatives to the project exist
  - Mitigation measures can be implemented that would protect wetland functions and values
  - The Variance is necessary to accommodate an overriding public interest – the regulations state that this is intended to be employed only in rare and unusual cases.
- FEMA prohibits fill in the Regulatory Floodway unless it can be demonstrated that the project would not increase flood levels. Restriction of the floodplain through berm construction may necessarily increase flood levels post-construction.

COST

- In general, ***we feel that the cost for this concept would be significantly higher than either the dredging or dam removal options evaluated in the Alternatives Analysis Report*** due to the engineering and regulatory complexities discussed previously, and because this project would require both dredging and dam breaching.
- We do not feel that the use of dredged material to create berms as suggested in the presentation would significantly reduce costs, since this material would require extensive handling, processing, and amendment in order to be useable for this purpose.

POTENTIAL FOR UNINTENDED NEGATIVE OUTCOMES

- The presentation suggests that Warner's Pond and Nashoba Brook are two different entities which can be separated from one another to improve ecological and recreational functioning.
  - In our view, Warner's Pond and Nashoba Brook are one inextricable entity. Warner's Pond is simply a permanently flooded section of Nashoba Brook's floodplain. ***Attempting to separate Warner's Pond from Nashoba Brook is more likely to cause new problems than solve existing ones.***
- ***As a general rule, highly modified and engineered systems typically have a greater likelihood of problems and higher costs for long-term maintenance than simpler, nature-based systems.***

POTENTIAL FOR UNINTENDED NEGATIVE OUTCOMES

- A fundamental question related to the feasibility of this concept is how water levels in the isolated pond would be maintained without inputs from Nashoba Brook. The presentation states that the pond would be filled by groundwater, like Walden Pond.
- In our view, ***Warner's Pond as we know it today exists only as the result of the flow of water in Nashoba Brook being impounded by the dam***, and we question whether groundwater inputs (+ precip) would be sufficient for maintaining a pond that provides ecological and recreational value.
- Natural glacial kettle ponds such as Walden Pond and White Pond are usually deep compared to their surface area and are naturally recharged through precipitation and groundwater inflow.
- Walden Pond is 8x deeper (both max and avg) than Warner's but is only 30% larger in surface area. White Pond is 5x deeper (both max and avg) than Warner's but is 20% smaller in surface area.
- The depth of Walden and White Ponds results in a greater intersection of the surrounding water table and input of groundwater than could be expected at Warner's Pond.
- Water levels in natural glacial kettle ponds can fluctuate seasonally and year-to-year by several feet. In our view, ***it is unlikely that Warner's Pond could be realistically dredged to a depth that would provide sufficient volume to support ecological and recreational functions – especially in drier conditions – from groundwater inputs alone***.

SUMMARY

- **Post-construction conditions could be summarized as follows:**
  - After being isolated from its former primary source of water, water levels in Warner's Pond decline and are subject to seasonal and year-to-year variations. ***Marked reduction in the quantity and quality of aquatic habitat.***
  - Water quality in what remains of Warner's Pond is degraded compared to current conditions. DO levels decrease and temperatures increase. Long-term adverse impacts to fish and wildlife habitat; aquatic species are isolated from adjacent habitats and populations. Algae blooms may become more common. ***Marked reduction in the quality of aquatic habitat.***
  - The Warner's Pond dam is removed, restoring fish passage through Nashoba Brook. Nashoba Brook flows through a reduced floodplain, leading to ***increased velocities and risk of erosion and flooding*** in areas where these impacts did not occur previously.
- **We believe there is very little to no regulatory pathway for this concept**
- **We expect that the costs for implementing this concept would likely be significantly higher than either project option considered in the Alternatives Analysis**
- **In our view, this concept is more likely to exacerbate ecological damage than to solve existing issues**