

07FY25



TOWN OF CONCORD
COMMUNITY PRESERVATION COMMITTEE
141 KEYES ROAD, CONCORD, MA 01742
TEL. (978) 318-3290 FAX (978) 318-3291

Application for CPC Funding

Due no later than 12:00 noon on Friday, September 8, 2023

Applicant*: Town of Concord - Natural Resources Division

Federal Tax Id. No.*: _____

Co-Applicant (if applicable): _____

Project Name*: White Pond A-Pod Program

Project Location/Address (if applicable): White Pond

Purpose*: (Select all that apply)

Open Space Community Housing Historic Preservation Recreation

Project Budget*:

Amount of CPC Funds Requested:	\$	<u>\$ 30,000</u>
Amount from Other Funding Sources:	\$	<u>\$ 32,500</u>
Total Project Budget:	\$	<u>\$ 62,500</u>

(If multi-year project, note current phase only)

Please check which of the following is included with this Application:

- | | |
|---|--|
| <input checked="" type="checkbox"/> One Paragraph Project Summary * | <input checked="" type="checkbox"/> Architectural plans, site plans, photographs (if appropriate) |
| <input checked="" type="checkbox"/> Map (if applicable) | <input type="checkbox"/> Copy of IRS determination letter (Non-profit Organizations only)* |
| <input checked="" type="checkbox"/> Narrative * | <input type="checkbox"/> Copy of Audit or most recent Financial Information (Non-profit Organizations only)* |
| <input checked="" type="checkbox"/> Selection Criteria and Needs Assessment | <input type="checkbox"/> Letters of Support (If any) |
| <input checked="" type="checkbox"/> Detailed Project Budget * | |
| <input checked="" type="checkbox"/> Feasibility Assessment | |
| <input type="checkbox"/> Statement of Sustainability (if applicable) | |
| <input checked="" type="checkbox"/> Timeline * | |

Project Contact Person*: Della Kaye, Natural Resources Director

Project Contact Address*: 141 Keyes Road, Concord, MA 01742

Project Contact Phone*: 978-318-3285 Email*: dkaye@concordma.gov

Authorized Signature of Applicant*: *Della Kaye*

Authorized Signature of Property Owner* (if different): *Kerry J. Feltus*
* Required

For Historic Preservation Projects Only – please check the box below left and acknowledge:

- I/We have read the U.S. Secretary of the Interior's Standards for the Treatment of Historic Properties and understand that planning for and execution of this project must meet these standards.

Project Summary

The Town of Concord - Natural Resources Division is requesting CPA funding in the amount of \$30,000 to purchase two Sentinel A-Pods to continue water quality improvement efforts at White Pond. Funds will also be used for 2024 maintenance services. Funding is requested from the Open Space and Recreation Categories.

Narrative

White Pond is a 40-acre Great Pond in Nine Acre Corner. The pond was briefly described by Henry David Thoreau in Walden, where he characterized the somewhat smaller pond as “the lesser twin of Walden.” Like Walden, White Pond is a natural kettle pond with no perennial surface inlets or outlets. Water levels in White Pond regularly rise and fall several feet over multiple year periods, and maximum water depths are typically in excess of 50 feet.

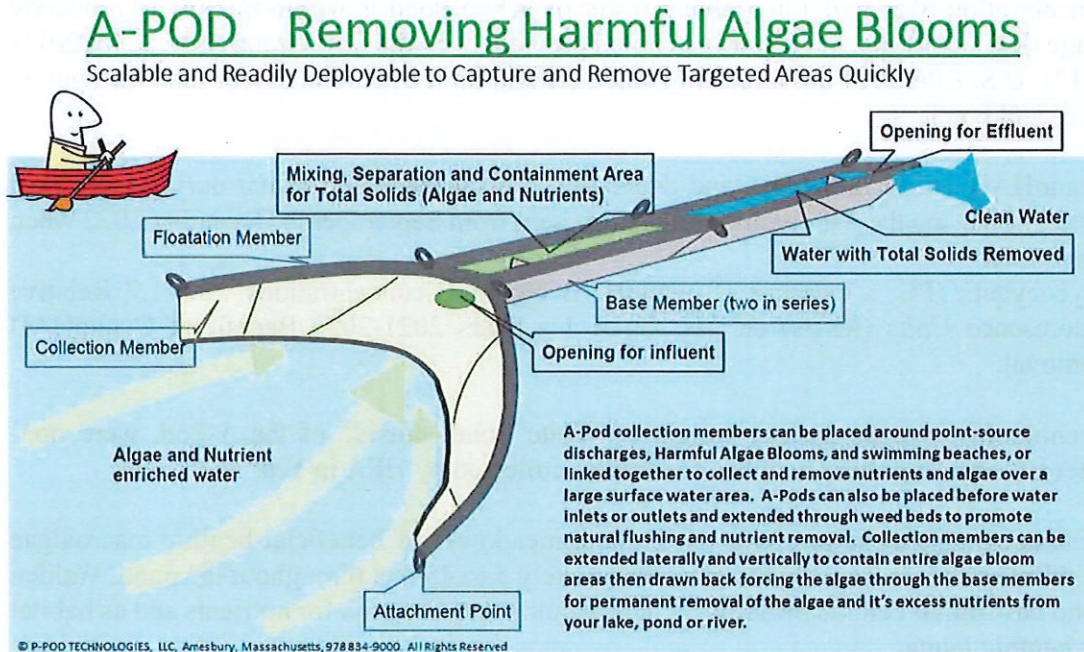
The majority of the White Pond shoreline and its approximately 113-acre watershed is occupied by year-round residences, although large, Town-owned parcels of undeveloped land are present at the southern end of the pond (Sachem’s Cove). The Town also now operates the swim beach formerly owned and managed by the White Pond Associates on the eastern shore. The Office of Fishing and Boating Access hosts a public access cartop boat launch and small parking lot next to the Town Beach. Privately owned parcels provide additional recreational access to White Pond for beach association members and neighborhood residents.

In the 1980s, algal blooms were periodically observed on the pond and raised concerns that water quality problems were beginning to emerge. One of the blooms was sampled and found to host several types of cyanobacteria (blue-green algae). Although cyanobacteria are naturally occurring at low levels in most waters, they have the potential to produce harmful aquatic blooms (HABs) under some conditions. This spurred a series of Town-funded water quality and hydrogeologic studies between 1986 and 1990. These studies concluded that high levels of nutrients, primarily phosphorous, were reaching White Pond from human sources (cultural eutrophication) and could result in degradation of the pond if action was not taken. To address this problem, control or elimination of watershed phosphorus sources, such as direct surface run-off and poorly functioning septic systems was recommended. In 2019, the Natural Resources Division (funded through the Community Preservation Act) undertook a significant slope restoration effort at Sachem’s Cove to address surface water runoff from Town land. Stormwater drainage is partially controlled, but better management is challenging due to the private status of some roads in the White Pond neighborhood.

Every year between 2015 and 2021, due to the presence of cyanobacteria blooms, the Health Division posted advisories against swimming and other direct contact for people and their pets. In July 2021, the Town was contacted by Higgins Environmental Associates Inc., (HEA) who proposed using a developing technology to trap and remove cyanoHABs from the pond, and this technology was piloted at White Pond (free of charge) between August and October of that year.

The A-Pod Hab Trap and Removal Process is an open-water technology, funded by the National Science Foundation, that works either passively or actively. In passive mode, HABs are concentrated in the “base member or trap” portion of the A-Pod by wind-induced and natural water

currents. In active mode, extendable and detachable “collection members” of the A-Pod are extended around targeted HAB areas in the pond, then drawn back forcing water with suspended HABs into the A-Pod’s trap. When targeted HABs are sufficiently concentrated, the trap is closed and HABs can then be permanently removed from the water body.



In 2022 and 2023, the Town contracted with HEA to deploy A-Pods at White Pond between June and October, and other than small, early season concentrations of cyanoHABs, the pond remained open and no recreational use advisories were necessary in either year.

Highlights from HEA’s 2022 end of year report note the following:

- An estimated 388.5 dry to moist pounds of cyanoHABs and suspended solids were permanently and sustainably removed from White Pond and biodegraded on land in a controlled manner.
- A fifty one percent (51%) reduction in cyanoHAB biovolume (e.g., cyanoHAB biomass by water body volume) was achieved for White Pond from October 2021 to October 2022.
- Board of Health restrictions or advisories for water contact were not required or issued in Year 2022 when a total of four A-Pods were in-place and functioning to control and remove cyanoHABs and cyanotoxin health risks.
- Water clarity improved to a Year 2022 (May to November) median of 24.2 feet versus the historic 30- year (1987-2017, typically June to August) median of 19.6 feet.

- The phosphorus concentration in cyanoHAB solids removed from 2021 to 2022 decreased by 44%; the biogeochemically-active nutrient sulfur decreased by 27%; and total nitrogen increased by 211% in cyanoHABs removed over time which corresponded to a 285% (maximum of 0.5 mg/L) increase in total-nitrogen concentration of surface water outside the A-Pod Trap and collection area from June to October 2022. This total nitrogen concentration (0.5 mg/L) in ambient water of White Pond is within the low to moderate range (less than 1 mg/L) for nitrogen noted previously by the ESS Group (ESS 2015, 2016-2017). U.S. EPA 2014 has a recommended criteria limit of 0.36 mg/L for total nitrogen in lakes and pond.
- CyanoHAB scums in White Pond decreased in occurrence and extent during ecological restoration using the A-Pods and were not present from September to December 2022 when open water
- phycocyanin (PC, a measure of cyanoHAB biomass) concentrations were 1.7 Relative Fluorescence Units (RFUs) or less, Chart 1 - Years 2021-2022 Benefit of CyanoHAB Removal.
- Cyanotoxins in open surface waters of White Pond, outside of the A-Pod, were non-detectable by laboratory analysis of samples collected by HEA in Year 2022.
- HEA documented the presence of “benthic meadows” of beneficial benthic macroalgae (Nitella) and moss from depths of approximately 5 to 45 feet throughout the pond. Walden Pond has similar benthic meadows. These would serve as a sink for nutrients and as habitat for benthic fauna.
- HEA documented a predominantly clockwise water flow in White Pond with shallow (top 4 feet) water velocities between 6 to 8 feet per minute. Water flow eddies were documented in areas of shallow bathymetric and shoreline structure changes.

Now that the bulk of the cyanoHABs and excess nutrients that had accumulated over the last several decades have been removed, we are planning to embark on the “Sentinel” version of the A-Pod to provide ongoing control of cyanoHABs at White Pond. HEA recommends two Sentinel A-Pods, which each have a life expectancy of ten years, at a cost of \$18,000 each. We also intend to purchase an annual service contract (\$24,000) to have HEA complete weekly to monthly field inspections from May to October to assess water quality conditions, operation of deployed A-Pods, and to remove or deploy A-Pods as warranted including for removal of suspended solids (cyanoHABs, nutrients, tree pollen, etc.) trapped within each A-Pod.

CPC’s Selection Criteria and Needs Assessment

This Application meets the following Selection Criteria as found in the 2023 Community Preservation Plan.

- a.) *Eligibility* – Under the CPA legislation, CPA funds can be used for “the acquisition, creation, and preservation of open space”, and “...extraordinary repairs to historic resources, open spaces, lands for recreational use...” This proposal seeks funds to

implement water quality improvements and therefore qualifies for CPA funding for open space and recreation purposes.

- b.) *Consistency with Town-wide Planning* – The water quality improvements are consistent with the objectives of both the 2015 Open Space and Recreation plan and the 2018 Comprehensive Long-Range Plan, which both speak to preserving and improving water quality and recreational access.
- c.) *Support by Boards, Committees, Community & Town Meeting Actions* – See above response.
- d.) *Enhancement of existing Town-owned open space, recreation, historic, and/or housing assets* – Providing clean water for swimming and nature study is an important component of the value of the Town-owned White Pond Reservation and the Town Beach.
- e.) *Service of Multiple or Underserved Populations* – Town conservation lands are open to all. As a state Great Pond, the pond is open to the public for fishing, fowling, and recreation, and is stocked biannually by the state with coldwater species such as rainbow and brown trout. Several individuals and families purchase beach or day passes for the Town Beach.
- f.) *CPA Purposes* – This proposal meets two of the four CPA purposes; open space and recreation.
- g.) *Administrative and Financial Management* – The project will be administered by the Division of Natural Resources, which has extensive experience overseeing CPA and other grant funds.
- h.) *Successful Implementation of Similar Projects* – Division of Natural Resources staff has successfully overseen the A-Pod implementation since August 2021.
- i.) *Site Control* – Great Ponds and their underlying lands are generally held in trust by the state for the benefit of the general public.
- j.) *Financial Need* - The Town has provided funding for water quality monitoring in 2022 and for the A-Pods in 2022 and 2023. We intend to continue to carry \$30,000 in capital costs in the Town's budget, and supplement this with CPA funds.
- k.) *Sources of Funding* – Please see above response. In addition, the Town will continue the water quality monitoring conducted in-house in 2023, as well as provide in-kind contributions of staff time for project administration.
- l.) *Project Plan Feasibility* – The A-Pod program was piloted in 2021, and has been successfully implemented in 2022 and 2023. We have every expectation that the project will continue to be feasible and beneficial to the pond and its users.

- m.) *Urgency of Project* – New cyanoHABs and increasing cyanoHAB biomass could occur over time just from nutrients introduced from water fowl, tree pollen, people swimming in the pond, ground water inflow, precipitation and similar regardless of any available non-point source nutrient controls by other means. The Sentinel A-Pod is designed for long-term, ongoing maintenance deployment, as needed, in a water body with prior cyanoHAB impacts.
- n.) *Maintenance Provisions* – The Sentinel A-Pods are designed to serve as maintenance water quality control measures. The service contract is also intended to ensure the A-Pods continue to function as designed.
- o.) *Permanent Restriction* – No permanent restriction is proposed as part of this project.
- p.) *Reimbursement* – This proposal does not seek reimbursement of previously appropriated funds.
- q.) *Incorporation of Sustainable Design Features* – By its very nature, the A-Pods are sustainable, requiring no use of chemicals or disruptive cyanoHAB removal techniques.
- r.) *Four Sustainability Principles* – The A-Pod program uses no chemicals, fossil fuels (other than contractor transport to and from the site, and fuel for a Jon boat), underground metals, or minerals.
- s.) *Local Qualified Vendors* – HEA is considered a sole source vendor for this technology and is based in Amesbury, Massachusetts.
- t.) *Land Acquisition Projects* – N/A

Timeline

The Town will enter into a contract with HEA in July 2024.

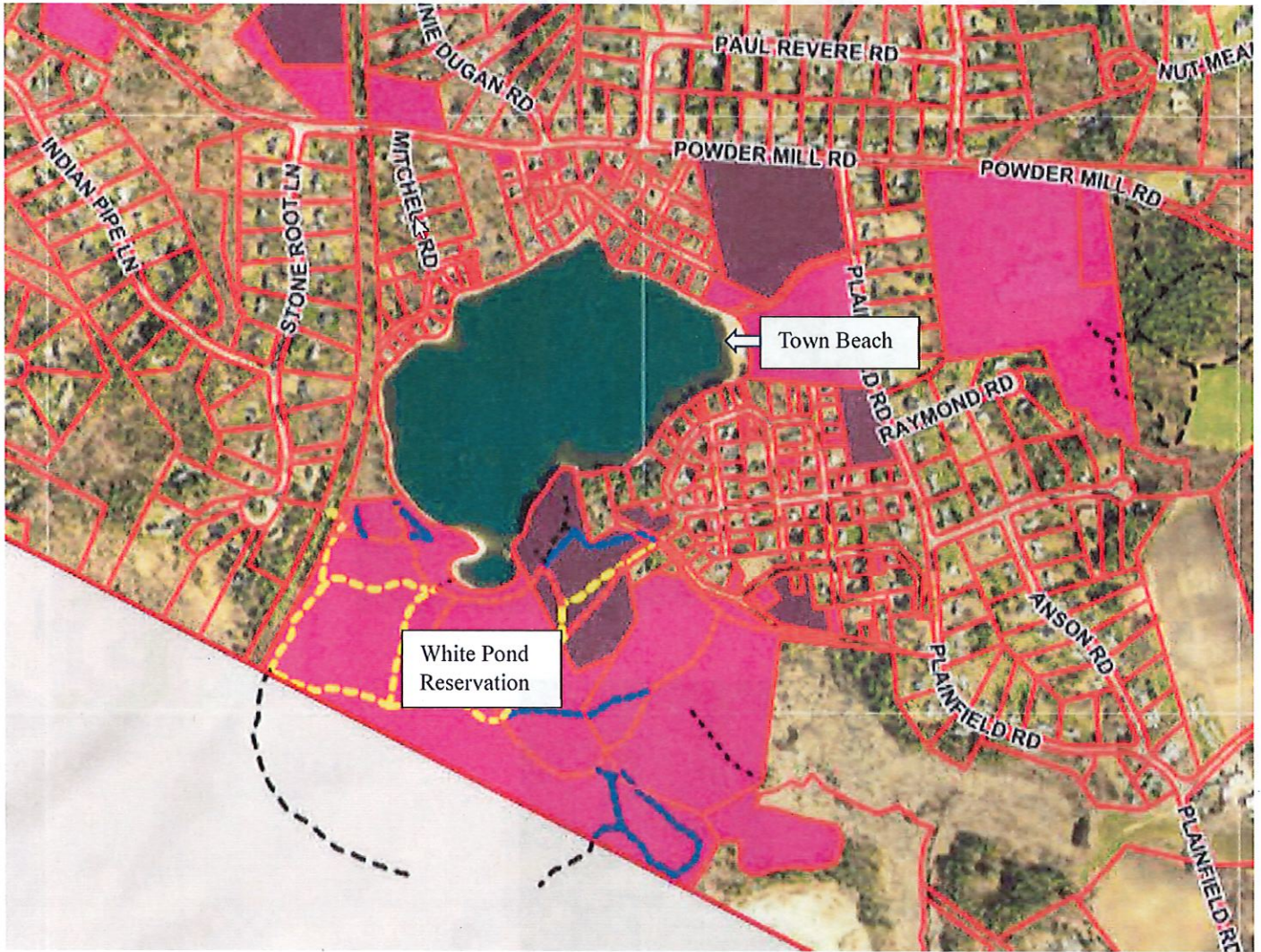




Figure 1: Cyanobacteria bloom (2015)

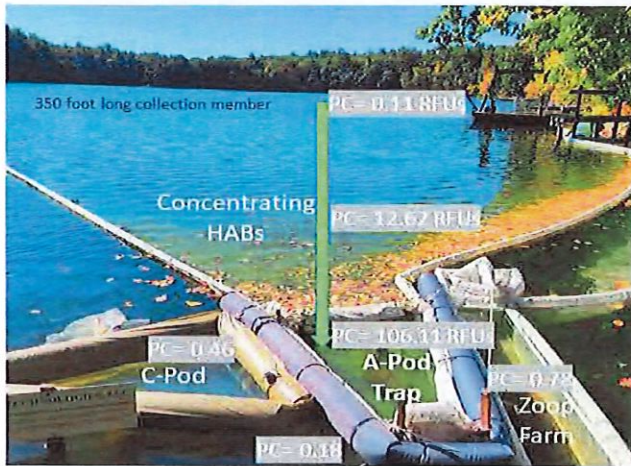


Figure 2: Cyanobacteria bloom (2019)

A-POD HAB TRAP AND REMOVAL PROCESS

Efficient and rapid removal of cyanobacteria, their toxins, excess nutrients and carbon from natural waters.

One Favorable Day of Passive Use = 1,000 fold increase in suspended cyanobacteria biomass (phycocyanin; PC) trapped and removed. Note: these were cyanobacteria dispersed in the water column – not surface scums. Scums formed later in A-Pod trap area due to trapped high cyanobacteria biomass.



October 13, 2021



October 14, 2021

