

## ***Project Purpose & Description***

### Introduction

Giants Neck Improvement Club, Inc. is proposing to remove accumulated organic matter from the Lower Nehantic Pond by hydro-raking. The purpose of the proposed material removal is to maintain the existing open-water habitat present within the pond in order to sustain habitat diversity and improve habitat conditions for finfish. The proposed activities and required analyses are provided in detail below.

### Proposed Activities

The applicant is proposing the following work:

- Remove by hydro-rake method approximately 9,095 cubic yards of organic material from Lower Nehantic Pond to increase the overall depth by 2' below the existing accumulated organic matter layer, and transport the material to Lombardi's Sand and Gravel, 18 Sachatello Drive, Oakdale, CT, for final placement at their gravel quarry in Sprague, CT, or at Hunts Brook Farm, 8 Hunts Brook Road, Quaker Hill, CT 06375, for final placement on the upland.
- Remove approximately 9,107 square feet of *Phragmites australis* and cattails in the areas shown on the project plans.
- Redistribute sand located in the nearshore area of the pond over an approximately 3,000 square foot area adjacent to the spillway as shown on the project plans.

Through correspondence with the DEEP Inland Water Resource Division, it was determined that the proposed work is considered "maintenance" and will, therefore, not require a Water Diversion Permit from the DEEP. The correspondence is included in Attachment I.

### Project Purpose

The primary purpose of the proposed work is to maintain the recreational value of the pond for the adjacent land owners and to improve the habitat diversity by sustaining the existing open-water habitat and removing invasive species.

### Construction Methodology

The proposed work will be conducted using the following methodology. This process has been illustrated on the attached project plans for clarity:

#### *Proposed Hydro-raking and Vegetation Removal*

- Prior to the initiation of hydro-raking activities, the contractor will place 30 cubic yard covered material transport containers at various points along the perimeter of the pond as shown on the project plans. A silt fence and hay bale dike will be installed on the downslope side of each container. No containers will be placed within the town right-of-way.

- The contractor will place coir fiber silt socks around the catch basin on the east side of Brockett Road to prevent dredge material from entering the catch basin.
- The contractor will place construction matting as necessary along the shoreline of the pond in order to prevent adverse impacts to inland wetland vegetation during transfer of the hydro-raked material from the pond to the dewatering containers.
- A land based excavator will begin the project by removing consolidated sand deposits in the southeast corner to facilitate launching of the hydro-rake rig.
- Using a tilt trailer attached to a truck, the contractor will launch the hydro raking rig(s) into the pond. The launching location is shown on the project plans.
- Using a rake attachment, the rig will remove aquatic plant species with attached root systems, debris, and accumulated organic matter from the pond. As the rake attachment is porous, dewatering will occur directly over the water prior to transfer into the covered containers. When the rake attachment is at capacity, the rig will travel back to the shoreline where the material will be transferred to a skid steer or similar equipment. The material will then be deposited into the covered containers.
- Once the covered containers are approximately half full, they will be hauled to the disposal site.
- This process will be repeated until such time as the proposed hydro-raking is completed.

#### *Transportation of Material*

- Once properly dewatered, the material will be transported by truck in the covered containers to the disposal site.

\**Phragmites australis* disposal will occur in a manner consistent with the recommendations for herbaceous plants set forth in the “Guidelines for Disposal of Terrestrial Invasive Plants” published by Connecticut Invasive Plant Working Group, which is a joint venture of CT DEEP and the University of Connecticut. While the working group identifies several acceptable disposal options, the most likely means of disposal for this project is to place the cut stalks in black trash bags and allow them to rot in a sunny location for several weeks, then dispose of them in dumpsters.

#### *Redistribution of Sand*

- Using a land based backhoe or excavator the contractor will pull the sand from the nearshore areas and grade it evenly in the area shown on the project plans.

#### *Equipment Re-fueling*

- The hydro-rake will be re-fueled each morning prior to the start of daily operations. The hydro-rakes will be located in-water at the shore of the pond and re-fueled using hand held diesel cans. The fuel filler necks will be surrounded by absorbent padding to prevent any spilled gasoline from entering the pond.

### Construction Schedule

Work will be conducted over a period of sixty (60) working days between February 20<sup>th</sup> and April 30<sup>th</sup> of any given year, an/or between September 15<sup>th</sup> and December 15<sup>th</sup> of any given year. It is anticipated that the proposed hydro-raking will occur over only one working period, though the applicant requests approval to resume work in the next working period if delays are encountered that prevent removal of the full amount of material within one working period.

### Pond Management

The proposed hydro-raking is part of a broader overall management plan to control sedimentation and maintain the habitat diversity and health of the pond. Hydro-raking can restore the pond depth through the removal of plant material and organic matter, which will increase available open water habitat for aquatic fauna. It can also remove excess nutrients such as nitrogen and phosphorous which can lead to nutrient overloading (eutrophication), and eventually anoxic conditions. Lastly, hydro-raking can increase the dissolved oxygen within the water, through increased water movement. The plan also includes a post hydro-raking survey documenting the amount of material removed and water quality, and periodic herbicidal treatment of remaining stands of *Phragmites*.

### Description of Soil Types on Site

Through consultation with the Natural Resources Conservation Service's Web Soil Survey, it has been determined that mapped soil types in the immediate vicinity of the pond consist of Hinckley loamy sand and Charlton-Chatfield complex. The Web Soil Survey map is included as Attachment D for reference. The inland wetland delineation was conducted by observing the clear indication of the upland extent of Ordinary High Water, the identification of inland wetland species, and the presence of steep slopes immediately upland of the vegetation. As a result, a site specific soil delineation was not necessary.

The pond itself is open-water and, therefore, does not have a designated soil type. As such, the proposed hydro-raking will not result in the removal of wetland soils.

### Description of Wetland Vegetation

The wetland habitat surrounding the pond is a mix of many plant species, including predominantly the invasive *Phragmites australis* and fringing and emergent wetland comprised of Broad-leaved cattail (*Typha latifolia*), Soft-stem bulrush (*Scirpus validus*), Lurid sedge (*Carex lurida*), and Arrow arum (*Peltandra virginica*). The surface of the pond is dominated by fragrant water lily (*Nymphaea odorata*). This species of water lily is native to Connecticut inland ponds. The inland wetland delineation flags are shown on the project plans and the Registered Soil Scientist/Professional Wetland Scientist's delineation summary is included as Attachment C.

### Sedimentation and Erosion Controls

As the proposed hydro-raking represents excavation occurring within, rather than adjacent to a watercourse and no exposed upland sediment will be excavated, the primary sedimentation and erosion control measures to be implemented have been designed to be consistent with the recommendations contained in the CT Guidelines for Soil Erosion and Sediment Control related to Dewatering of Earth Materials. Consistent with these guidelines:

- The containment area is located outside of the wetlands and watercourse. A silt fence and hay bale dike will be installed on the downslope side of each container to prevent any upland sediment that is disturbed by the placement of the containers from entering the inland wetlands.
- The covered material transport containers will act as the containment berms necessitated by the material saturation.
- The containers are designed to accommodate the volume of material to be stored at any given time.

In addition, the proposed construction matting will prevent equipment from destabilizing the soils and vegetation during material transfer. Therefore, this will eliminate the potential for deposition of disturbed sediment into the pond or adjacent inland wetland vegetation. In the event that the containers disturb the underlying upland soils on which they will be placed, the disturbed areas will be hand raked back to a level grade and seeded with either hydro seed or an appropriate erosion control mix to provide proper restoration. Finally, a floating turbidity curtain will be installed on the pond side of the spillway to prevent any suspended sediment from leaving the immediate waterbody. The turbidity curtain will remain in place throughout the duration of the proposed work.

### Project Alternatives Analysis

In arriving at the conclusion that the proposed hydro-raking is the most appropriate activity to meet the applicant's goals of maintaining the recreational value of the pond for adjacent land owners and sustaining the open-water habitat to improve wildlife diversity and finfish habitat value of the pond, several design alternatives were evaluated. The "no action alternative" is represented graphically by the existing conditions shown on Topographic Survey, Sheet 1 of 1, of the project plans. As the remaining alternatives are similar in concept to the proposed work and do not change the aerial extent of the project, they are substantially depicted in the proposed conditions shown on the Site Plan, Sheets 1 and 2 of 2. Below is a discussion of each alternative and the rationale for either dismissing or pursuing said design.

#### ***No Action***

The first alternative considered was a "No Action Alternative" in which the applicant would pursue no maintenance measures at this time. However, this alternative is not desirable because, absent maintenance of the current depths, continued sediment accumulation will lead to the elimination of open-water habitat and the creation of swamp habitat.

Not only will this cause adverse aesthetic impacts for the properties surrounding the pond, which would lower the property values and the associated tax base, but there would also be a loss of habitat diversity as the pond changes from an environment containing open-water and fringing wetland habitat to a homogenous, stagnant swamp. Furthermore, given the presence of *Phragmites australis* along the shallow fringes of the pond, progressively shallower conditions will allow this vegetation to proliferate, further reducing the habitat value of the overall wetland habitat. As a result, this is not the preferred approach.

#### ***Conduct Hydro-raking To Increase Depths by 1'***

The second consideration was to conduct hydro-raking such that overall depths would only increase by 1'. This would achieve the applicant's goals of maintaining the recreational value of the pond for adjacent land owners and sustaining the open-water habitat to improve wildlife diversity and finfish habitat value of the pond, and reduce the overall project cost due to the reduction in material to be hydro-raked and project duration.

However, hydro-raking to a shallower depth means that more frequent, subsequent hydro-raking work will be necessary in order to maintain the desired conditions. This leads not only to greater expense, but greater habitat disturbance due to increased hydro-raking frequency. Accordingly, this alternative was dismissed from further consideration.

#### ***Only Hydro-Rake the Shallowest Areas 2' Deeper***

The third project design evaluated consisted of hydro-raking only the shallowest areas to 2' deeper than current depths. This would meet the applicant's goals in the near-term by addressing the areas most susceptible to siltation, thereby prolonging the open-water habitat within the pond.

However, siltation is occurring throughout the entire pond. Therefore, ignoring certain areas of the pond will lead to a more intensive future hydro-raking project requiring the removal of a greater volume of material than is currently proposed due to continued accumulation of material within the deeper portions of the pond. This will lead to greater future maintenance expenses and wildlife disturbance, as the hydro-raking activities will have a longer duration. Thus, this is not the preferred alternative.

#### ***Conduct Hydro-raking to 2' Overall Depth Increase (Current Proposal)***

The final design alternative evaluated was to propose hydro-raking of the pond such that all areas will be increased in depth by 2'. This would achieve the applicant's goals of maintaining the recreational value of the pond for adjacent land owners and sustaining the open-water habitat to improve wildlife diversity and finfish habitat value of the pond. In addition, this would minimize future expenses by creating depths that limit the need for future maintenance hydro-raking. Therefore, this is the preferred alternative.

### Ecological Assessment

As discussed previously, the subject site consists of a fringing wetland and emerging wetland habitat with an open-water component. The wetland delineation identified the presence of the plant species Broad-leaved cattail (*Typha latifolia*), Soft-stem bulrush (*Scirpus validus*), Lurid sedge (*Carex lurida*), and Arrow arum (*Peltandra virginica*). The surface of the pond is dominated by fragrant water lily (*Nymphaea odorata*), a species of water lily that is native to Connecticut inland ponds.

A 2003 ecological assessment conducted by Priscilla W. Baillie, Ph.D. confirmed that the pond is habitat for the Canada goose, common tern, double-crested cormorant, herring gull, kingfisher, mallard, mockingbird, snowy egret and tree swallow. The pond is also identified as habitat for bluegill and large-mouth bass. This ecological study did not observe the presence of frogs or turtles utilizing the pond in 2003.

The proposed project has been designed to minimize potential adverse impacts to the habitat and wildlife within the pond. The proposed hydro-rake methodology creates only localized disturbance due to the fact that the capacity of the rake attachment is such that multiple lifts are required to achieve desired depth. Also, the transfer of material to the dewatering containers adds additional time to the process. This means that the rig will remain in one area of the pond for a considerable length of time, which allows finfish to relocate to other areas of the pond to avoid mechanical disturbance and turbidity while the rig is operating.

With respect to large-mouth bass and bluegill specifically, the proposed hydro-raking will not significantly alter the habitat or create depths that are inhospitable to these species. Large-mouth bass typically inhabit depths between 2 and 12 feet, and spawn in depths ranging from 1 to 6 feet within 10 feet of shore. Based on the existing depth conditions as shown on Sheet 1 of 2 of the project plans, the proposed hydro-raking will create depths not in excess of 7.7' Ordinary High Water (OHW). The majority of the pond will remain shallower than 6' OHW throughout the pond within 10' of shore. Bluegill live and spawn in similar water depths. Therefore, the proposed hydro-raking will not adversely impact the pre-spawn or spawning habitat for large-mouth bass or bluegill.

Concerning inland wetland vegetation, the proposed work avoids hydro-raking the beneficial species found throughout the shoreline of the pond. The only vegetation to be removed through the proposed hydro-raking is the invasive *Phragmites australis* and the native, though undesirable, Broad-leaved cattail. Furthermore, the proposed hydro-rake depths are such that sloughing of vegetation into the pond is not a concern.

Inland wetland vegetation is further protected by avoiding any hydro-raked material stock piling within the vegetation. The use of construction matting during the transfer of hydro-raked material from the rig to the covered containers ensures that no soil destabilization or depressions will occur within the inland wetland vegetation.

The principal potential adverse impact to native bird species is disruption during the nesting season, as the use of heavy equipment can disturb nesting birds. Adverse impacts to these species can be minimized by limiting the duration of hydro-raking activities that take place during the nesting season, which is typically spring to mid-August for the species that have been documented. As the proposed hydro-raking will occur from mid-September to the end of October, the proposed work will not interfere with the avian nesting season.

With respect to frog and turtle species that may be present in the pond, these species are most susceptible to disturbance during the spawning season (early spring through early summer), and during hibernation, which occurs in the winter. The proposed construction windows avoid working within the majority of either the spawning or hibernating seasons. As such, the proposed hydro-raking will have minimal interference with frogs and turtles during these periods. Furthermore, as the proposed hydro-raking consists only of removing accumulated material and emergent stands of invasive vegetation from the pond, and does not represent a large physical alteration to the pond such as permanent deepening, widening, filling, or removal of wildlife habitat or wetland soils, any temporary adverse impacts should be deemed acceptable by the Inland Wetlands Agency.

In addition to avoiding and minimizing the potential for adverse impacts to the wetland and watercourse and native wildlife, the project also provides several environmental and economic benefits. The pond has undergone significant persistent sedimentation over time. Allowing this condition to continue unabated poses the potential for the pond to change from a diverse, fringing wetland and open-water habitat to a more homogenous, stagnant swamp habitat. This would reduce overall habitat diversity. The proposed hydro-raking ensures continued habitat diversity by maintaining the open-water habitat.

In addition, the proposed work improves the condition of the fringing wetland habitat through the proposed removal of the *Phragmites australis* and Broad-leaved cattails. *Phragmites australis* is an invasive species that, while not an obligate inland wetland species, can grow within inland wetland habitats and can proliferate in such moist/shallow water environments. This species has little value to native wildlife. The continued colonization of this species will reduce the value of the pond as wildlife habitat, leading to an overall reduction in the number of species that utilize the pond. The proposed methodology has the capability of penetrating deep enough beneath the substrate to completely remove the root system of these in-water stands of *Phragmites australis*. Therefore, the proposed *Phragmites australis* removal will forestall the proliferation of the species and preserve the value of the fringing wetland as habitat for wildlife.

While Broad-leaved cattails are native to inland wetland habitats, this species also has the potential to overtake the inland wetland. As with *Phragmites australis*, this would reduce vegetative diversity and, thus, the diversity of wildlife utilizing the habitat. The proposed removal of portions of the Broad-leaved cattails maintains habitat and wildlife diversity within the pond.

Furthermore, the proposed hydro-raking will likely improve water quality within the pond by removing sediments that may be nutrient rich due to animal waste and upland runoff. This will help to control excessive eutrophication that can lead to algal blooms and subsequent anoxic conditions in the pond.

As mentioned previously, the proposed hydro-raking activity also conveys economic benefits upon not only the property owners surrounding the pond, but to the Town of East Lyme. Maintaining and improving the habitat within the pond increases the aesthetic value of the waterbody. In turn, the properties abutting and overlooking the pond enjoy increased property values, as the view and access to the pond make such properties more desirable to potential buyers. Therefore, these properties receive a considerable return on investment from the aesthetic and recreational value of the pond. This value is significantly decreased if the pond habitat is not maintained and is taken over by invasive species with no aesthetic benefits and the water depths are not sufficient to support any recreational activities.

The increased property values created by the aesthetic and recreational appeal of the pond also benefits the Town of East Lyme by raising property assessments. Therefore, the Town receives greater tax revenue from the properties surrounding the pond.

Based on the above analysis, it is our conclusion that the proposed hydro-raking poses minimal adverse impacts to the pond and will lead to overall habitat improvements and economic benefits to the community and Town of East Lyme.