

1.0 Introduction

The "Applicant", the Town of Wales, is seeking approval to continue an Aquatic Management Program at Lake George. The objective of the management program is to control growth of nuisance aquatic plant species and employ defensive measures to avert the risk of a non-native infestation. Since the mid 1990s, the town of Wales has continued to support the Lake George aquatic management program ensuring open water habitat is preserved, water quality remains unpolluted (which promotes growth of less pervasive native plant species), all while providing safe recreational access to the pond.

Since the 1990s, SOLitude Lake Management (formerly Lycott Environmental) has performed annual chemical treatments and overseen seasonal lake-level drawdowns at Lake George to manage aquatic vegetation, primarily variable watermilfoil (*Myriophyllum heterophyllum*), tapegrass (*Vallisneria americana*), bladderwort (*Utricularia* sp.), pondweeds (*Potamogeton* spp.), waterlilies (*Nuphar* and *Nymphaea*), watershield (*Brasenia schreberi*) and filamentous algae. Treatments consisted of subsurface or foliar application of diquat (for submersed vegetation) or glyphosate (for floating vegetation), respectively. Copper based algaecides have also been used to manage algal blooms, as necessary. As of 2007, there have been no observations of variable watermilfoil within Lake George. Seasonal lake-level drawdowns have been part of the ongoing management plan at Lake George, which have been successful in limiting the amount of nuisance shoreline aquatic vegetation and minimizing chemical usage. The management plan, created and started by Lycott in 2009, aims to improve the capacity of the resource area, advance flood control and storm water damage prevention, and limit external nutrient loading to the lake. In recent years, few scattered purple loosestrife (*Lythrum salicaria*) were observed along the shoreline; recommendations were given to cut and pull the plants while densities were low.

The decades of lake management have protected the water body from harmful non-native, invasive aquatic plants, as well as nuisance aquatic plants. Based on the type, distribution, and density of nuisance species in Lake George, it has been concluded the restoration goals of the Applicant can best be achieved through the prudent use of USEPA/MA DAR registered herbicides and continuation of an annual, seasonal lake-level drawdown.

The proposed project has been filed as an Ecological Restoration Limited Project under 310 CMR 10.53(4) and will protect the interest of the Wetland Protection Act by controlling a nuisance species, improving fish habitat, improving water quality and slowing lake eutrophication.¹

2.0 Problem Statement:

Lake George is a 93-acre waterbody located in Wales, MA. There is an established littoral zone, where sunlight penetrates through the water to the sediment, which supports sparse to

¹ Department of Environmental Protection. Guidance for Aquatic Plant Management in Lake and Ponds as it Relates to Wetlands. Technical Report No. 1.0. Date of Publication: April 2004, 1p.

moderate density growth of waterlilies, watershield, tapegrass, and bladderwort; pondweed species have been reduced to trace/sparse densities and variable watermilfoil has not been observed since 2007. When unmanaged, dense growth of vegetation can degrade water quality, fish/wildlife habitat, and reduce recreational access to the pond. Based on the goals of the Applicant, a management program using chemical treatment with USEPA/MA DAR approved herbicides and algaecides is proposed to control the nuisance plant and algae species to maintain open water conditions and maintain desirable water quality.

Since the early 1990s, monitoring and management of invasive and nuisance plants has been performed at Lake George. Yearly herbicide treatments have been successfully performed to maintain desirable densities of native plant species and prevent further infestation.

3.0 Site Description:

Lake George ²	
Surface Area (acres)	93
Est. Mean Depth (feet)	6
Maximum Reported Depth (feet)	13
Estimated Volume	558 ac-ft. (181.8 million gal.)
Dominant Plant Species	Waterlilies Watershield Tapegrass Bladderwort Pondweeds

Lake George is a 93 acre waterbody with water flowing northward into and through the lake, exiting through Wales Brook under Stafford Road.

Groundwater and surface water runoff from the watershed (~819 ac) are the primary water sources to Lake George. The shoreline of the lake supports moderate residential development and the waterbody is used for swimming, fishing, and passive wildlife viewing.

4.0 In-Lake Management Recommendations:

4.1 Program Overview:

Multiple-year approval is requested for the continuation of the successful Aquatic Management Program at Lake George. The goal of the management program is to control growth of floating-leaved species, in addition to other nuisance aquatic plant species, to

² Estimates based on observed and reported conditions

improve and maintain open water habitat, promote growth of less prevalent plant species, and provide safe recreational access to the lake with the use of USEPA / MA DAR registered aquatic herbicides and algaecides. Based on the chemistry of the proposed products, along with the chemical dose, timing and method of application, these herbicides can be reasonably selective for the targeted plant species with a negligible risk to non-target organisms when used in accordance with their USEPA approved labels. The management program has been developed to be compatible with the goals of the pond community keeping in mind the regulatory responsibilities of the Wales Conservation Commission and the MA DEP.

Specifically, we are requesting approval for use of Reward (diquat) and AquaPro (glyphosate) herbicides and copper-based algaecides to control growth of nuisance plants and algae. The proposed products specifically affect the target plant species to be controlled and have a negligible effect on the non-target species and wildlife when applied in accordance with the label directions. All chemicals are applied at or below suggested doses according to the product label. In addition, doses are based on plant types and densities, so that a minimum amount of the chemicals are introduced into the lake.

Further, we recommend continuing a seasonal winter lake-level drawdown, as draw-downs have been successful in limiting the amount of nuisance shoreline growth and have minimized chemical usage at Lake George historically.

No significant alteration to wetland resource areas will occur as a result of the proposed lake management program; instead the resource areas will be enhanced by controlling profuse aquatic plant species, and improving water quality.

4.2 Proposed Products

Diquat (Reward® - EPA # 100-1091 or equivalent)

Reward (diquat) is an effective herbicide for partial-pond treatments due to its rapid mode of action and short herbicide concentration-exposure-time requirements. Even though diquat is considered to be a contact-herbicide, longer term control may be seen as plants' root crowns will not be allowed to develop.

The USEPA/MA registered herbicide diquat dibromide will be applied to the area at or below the permissible label dose. Reward is a widely used herbicide, applied to greater than 500 lakes and ponds annually, throughout the northeast, to control nuisance submersed aquatic plants. Diquat would be applied to control milfoil, bladderwort, pondweeds, and other nuisance submersed plants at the application rate of 1.0-2.0 gal/acre, if necessary. Temporary water use restrictions for diquat are currently: 1) No drinking or cooking for 3 days. 2) No irrigation of turf for 3 days and of food crops for 5 days, and 3) No livestock watering for 1 day. There are no restrictions on swimming, boating, or fishing, but prudent herbicide/algaecide management, suggest that we close the pond on the day of treatment.

The shoreline of the pond will be posted with signs warning of these temporary water use restrictions, prior to treatment.

Diquat is translocated to some extent within the plant. Its rapid action tends to disrupt the leaf cuticle of plants and acts by interfering with photosynthesis. Upon contact with the soil, it is adsorbed immediately and thereby biologically inactivated. Residual levels of diquat in treated water decline rapidly and their reduction is due to the uptake by the targeted vegetation and adsorption to suspended soil particles in the water or on the bottom mud. Photochemical degradation accounts for some loss under conditions of high sunlight and clear waters.

Impacts Specific to the Wetlands Protection Act using Diquat³

- Protection of public and private water supply – Benefit (water quality improvement).
- Protection of groundwater supply – Neutral no interaction as diquat is absorbed to soil particles.
- Flood control - Neutral (no significant interaction).
- Storm damage prevention – Neutral (no significant interaction).
- Prevention of pollution – Generally neutral (no significant interaction), but could be a detriment if plant die-off causes low oxygen at the bottom of the lake.
- Protection of land containing shellfish - Generally neutral (no significant interaction), but reduced algae might reduce food resources for shellfish, and direct toxicity is possible under unusual circumstances.
- Protection of fisheries - Possible benefit (habitat enhancement) and possible detriment (food source alteration, loss of cover).
- Protection of wildlife habitat – Possible benefit (habitat enhancement) and possible detriment (food source alteration, loss of cover).

Glyphosate (AquaPro® - EPA # 62719-324-67690, Rodeo – EPA # 62719-324 or equivalent)

Glyphosate is used to control waterlilies, watershield and emergent plants such as purple loosestrife and common reed. It is typically applied in August/September for control of emergent species. Glyphosate would be applied at the recommended Federal/State concentration of 3 quarts/acre. There are no water-use restrictions associated with the use of glyphosate other than use in the vicinity of potable water intakes, but prudent practice calls for restriction of water usage on the day of treatment as an additional safeguard. Further, restricted entry into the treatment area(s) is recommended for 24 hours following the treatment. These restrictions are consistent with good pesticide practice and Massachusetts guidelines for aquatic treatments.

Glyphosate is a systemic herbicide and is foliar active. This means the herbicide is active only on contact with the plant. It has no activity in surrounding soil or water. The chemical is applied to the leaves of the target plant and is translocated down into the rhizomes or roots of the plant. Glyphosate is absorbed by plant foliage and moves throughout plant tissues. Once inside the plant, the active ingredient in glyphosate interrupts the plant's ability to produce a protein it needs to live. The protein that glyphosate targets is found only in plants. It does not

³ Commonwealth of Massachusetts Executive Office of Environmental Affairs. *Practical Guide to Lake Management*. 2004. 124 p.

exist in humans, wildlife or fish. Glyphosate binds tightly to most types of soil particles and is unavailable for root uptake. There is low potential for leaching or contamination of groundwater with glyphosate herbicide. Microorganisms in the soil and water break down into its natural components.

Impacts Specific to the Wetlands Protection Act using Glyphosate⁴

- Protection of public and private water supply – Protection of public and private water supply – Detriment (prohibition within one quarter mile of surface drinking water supplies due to toxicity), but generally neutral where allowed
- Protection of groundwater supply – Neutral (no interaction)
- Flood control - Neutral (no significant interaction)
- Storm damage prevention – Neutral (no significant interaction)
- Prevention of pollution – Generally neutral (no significant interaction), but could be a detriment if plant die-off causes low oxygen at the bottom of the lake
- Protection of land containing shellfish - Neutral (no significant interaction)
- Protection of fisheries - Possible benefit (habitat enhancement) and possible detriment (food source alteration, loss of cover)
- Protection of wildlife habitat – Possible benefit (habitat enhancement) and possible detriment (food source alteration, loss of cover)

Algaecides (Captain – EPA # 67690-9, SeClear – EPA # 67690-55, Green Clean PRO – EPA #70299-15, or equivalent)

Approval for the use of a copper or peroxide based algaecide is requested in the event that nuisance algae conditions develop, warranting treatment.

Copper based algaecides (i.e. CuSO₄, Captain, SeClear) are widely used and are applied to lakes and ponds throughout North America to control nuisance filamentous and microscopic algae. There are no water use restrictions associated with copper-based algaecides and SOLitude treats several direct, potable (drinking) water reservoirs and a number of recreation waterbodies in the Commonwealth with these algaecides, on a yearly basis. The concentrated liquid algaecides are first diluted with pond water and are then sprayed throughout the pond area. The application rate is generally 0.2 ppm or less for algae control. If applied, treatment will not exceed 50% of the pond volume.

Peroxide based algaecides (i.e. Green Clean PRO, Green Clean Liquid) are a recent addition to algae management. Similar to copper algaecides, there are no water use restrictions. The concentrated products are diluted with pond water and then sprayed evenly throughout the treatment area. The application rate is 0.5 – 1.5 gallons per acre-foot for algae control. If applied, treatment will not exceed 50% of the pond volume.

Impacts Specific to the Wetlands Protection Act using Copper⁵ and Peroxide algaecides

- Protection of public and private water supply – Benefit (used to control algae)
- Protection of groundwater supply – Neutral (no significant interaction)

⁴ Commonwealth of Massachusetts Executive Office of Environmental Affairs. *Practical Guide to Lake Management*: 2004. 128 p.

⁵ Commonwealth of Massachusetts Executive Office of Environmental Affairs. *Practical Guide to Lake Management*: 2004. 122 p.

- Flood control - Neutral (no significant interaction)
- Storm damage prevention – Neutral (no significant interaction)
- Prevention of pollution - Generally neutral (no significant interaction), but could be a detriment if algae/plant die-off causes low oxygen at the bottom of the lake or causes release of taste and odor compounds or toxins
- Protection of land containing shellfish - Generally neutral (no significant interaction), but reduced algae might reduce food resources for shellfish, and direct toxicity is possible under unusual circumstances.
- Protection of fisheries - Possible benefit (habitat enhancement) and possible detriment (food source alteration, direct toxicity)
- Protection of wildlife habitat – Possible benefit (habitat enhancement) and possible detriment (food source alteration, direct toxicity)

Proper herbicide application allows for targeted plant control without posing an unreasonable adverse risk to non-target species and wildlife. Written approval from the Commission will be sought should alternate products be considered in future years. All products proposed for use will be registered for aquatic use in Massachusetts.

Chemical Descriptions

Detailed information on all the products proposed in this NOI can be found at the **Massachusetts Department of Conservation and Recreation, Lakes and Ponds Program website**. There are links under the Publications tab to the "Generic Environmental Impact Report for Eutrophication and Lake Management in Massachusetts" and the "Practical Guide to Lake Management in Massachusetts."

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<http://www.mass.gov/eea/agencies/dcr/water-res-protection/lakes-and-ponds/lakes-ponds-more-pubs-generic.html> >

Additional information on these herbicides can be found at the **Massachusetts Department of Agricultural Resources website**:

<<http://www.mass.gov/agr/pesticides/water/Aquatic/Herbicides.htm>>

4.3 Monitoring:

Pre-management inspections will be conducted in order to finalize the treatment areas and assess the growth phase of the target plant species. Post-management inspections will be conducted in order to assess the efficacy of the management efforts and any impacts on non-target species so future applications can be properly adjusted to minimize non-target impacts.

5.0 Alternatives Analysis:

Alternatives to the proposed Aquatic Plant Management Plan were considered. SOLitude evaluated all available strategies for control of the nuisance aquatic species in Lake George. Findings and recommendations were based on direct experience and discussions found in

the *Eutrophication and Aquatic Plant Management in Massachusetts Final Generic Environmental Impact Review* (FGEIR, EOEIA 2004).

Annual Lake-level Draw Down: Recommended

Annual draw downs have been used at Lake George for a number of years. They have been effective at reducing the amount of nuisance vegetation in shoreline areas, thereby reducing the dependence on herbicide use. We recommend that continued, periodic draw downs be conducted as necessary to maintain desirably low vegetation in high-use, shoreline areas of the lake.

Bottom Weed Barriers: Not Recommended

Physical controls, such as the use of bottom weed barriers (i.e. Aquatic Weed Net or Palco) can be effective for small dense patches of nuisance vegetation, but are not cost effective or feasible for large areas. Weed barriers are expensive to install and maintain at ~\$1.75/ft² (material & installation). Semi-annual maintenance to retrieve, clean and re-deploy the barriers would be expensive and time consuming. Additionally, covering expansive areas of the pond bottom may also have detrimental impacts on invertebrates or other types of wildlife.

Hydro-Raking: Recommended

The mechanical Hydro-Rake can best be described as a “floating backhoe” with a York Rake attachment. The barge is paddle wheel driven to facilitate operation in shallow water (<2 feet) and it can effectively work to depths of about 12 feet. It works from the water, thereby avoiding damage to sensitive shoreline habitat and property. This machine “rakes” the upper sediment layer, collecting plants and their root systems. The Hydro-Rake is well suited for the removal of plants large rhizome structures and in that case can provide multiple years of control. Hydro-raking has been used by some homeowners at Lake George to remove excess sediment buildup within their shoreline areas to allow for better recreational use. We recommend continuing this as necessary and desired.

Harvesting: Not Recommended

Although harvesting of nuisance native plants could be considered at Lake George, the cost and disturbance would be significantly more than the current program, as this process requires a shoreline offload and disposal area. As a result, we are not recommended harvesting at Lake George at this time.

Biological: Not Recommended

There are no proven biological controls available or approved by the State for the control of the invasive aquatic plant species present at Lake George.

Sediment Excavation/Dredging: Not Recommended

Dredging nutrient rich bottom sediment is sometimes used as a strategy to control excessive weed growth. Conventional (dry) or hydraulic dredging would require the expenditure of hundreds of thousands of dollars in design and permitting fees alone. Dredging may also have severe impacts to aquatic organisms (i.e. fish and macroinvertebrates) in the ponds with no guarantees of elimination of invasive vegetation.

Do Nothing: Not Recommended

If the invasive and nuisance plant growth is allowed to continue unabated, eutrophication and filling-in at the pond will continue to occur at an accelerated rate due to the annual decomposition of excessive plant material. Anoxic conditions would degrade water quality and potentially impact fish and other aquatic organisms. Stagnant conditions will also increase water temperatures promoting both algae and bacterial growth as well as providing extensive mosquito breeding habitat. The pond's recreational and aesthetic value would be significantly degraded.

6.0 Compliance

Massachusetts Wetlands Protection Act:

The objective of this project is to control nuisance aquatic species through use of USEPA / MA DAR registered aquatic herbicides.

Controlling densities of native species will typically not adversely affect wildlife habitat and will not negatively impact other interests of the Massachusetts Wetlands Protection Act. No significant alteration to wetland resources areas will occur as a result of the proposed management program; instead the resource areas will be enhanced by controlling the nuisance plant growth. The proposed management activities are consistent with the guidelines in the following documents:

- Final Generic Environmental Impact Report: Eutrophication and Aquatic Plant Management in Massachusetts (June 2004)
- Guidance for Aquatic Plant Management in Lakes and Ponds: As it Relates to the Wetlands Protection Act (April 2004 – DEP Policy/SOP/Guideline # BRP/DWM/WW/G04-1)
- The Practical Guide to Lake Management in Massachusetts (2004)

DEP License to Apply Chemicals:

All chemical applications will be performed by Certified Applicators. The USEPA/MA registered aquatic herbicides will be applied at recommended label rates, in accordance with the "Order of Conditions" and DEP "License to Apply Chemicals" permits (BRP WM04). Prior to treatment the shoreline will be posted with signs, warning of all temporary water use restrictions. A site specific "License to Apply Chemicals" for the proposed treatment will be filed with Massachusetts DEP, Office of Watershed Management.

Massachusetts Environmental Policy Act:

The strategies proposed in this NOI are options approved under the Massachusetts Environmental Protection Act (MEPA) process that was approved in 2004 with the issuance of the FGEIR and the *Practical Guide to Lake and Pond Management in Massachusetts*. These approaches do not require individual MEPA review.

Massachusetts Endangered Species Act:

According to the most recent Natural Heritage maps provided by MA GIS (Attachment C - Figure 4), Lake George is not located within an area designated as Priority Habitats of Rare Species as determined by the Massachusetts Natural Heritage & Endangered Species Program (NHESP). A formal review by NHESP is not required.

7.0 Impacts of the Proposed Management Plan Specific to the Wetlands Protection Act:

Protection of public and private water supply – Lake George is not used directly as a drinking water supply. Aquatic herbicide treatment at the ponds will not have any adverse impacts on the public or private water supply, when used in accordance with the project label and conditions of the MA DEP License to Apply Chemicals.

Protection of groundwater supply – According to available studies, there is no reason to believe that the groundwater supply will be adversely impacted by the application of the chemicals at the proposed rates to Winter Pond, when used in accordance with the project label. Contamination of groundwater by aquatic herbicides is limited by their low rate of application, rapid rate of degradation, and uptake by target plants. Solitude’s State licensed applicators take all necessary precautions when mixing and disposing of all chemical containers.

Flood control and storm damage prevention – No construction, dredging or alterations of the existing floodplain and storm damage prevention characteristics of the pond are proposed. However, in some instances, abundant and excessive aquatic plant growth can contribute to high water and flooding. Most commonly this occurs in the vicinity of waterbody outlets or water conveyance channels and structures. The unmanaged, annual growth and decomposition of abundant plant growth is also known to increase sediment deposition at an accelerated rate. Therefore, the application of aquatic herbicides may increase the capacity of the resource area over the long-term to provide flood protection.

Prevention of pollution – No degradation of water quality or increased pollution is expected by the application of the herbicides. The proposed herbicides are relatively slow acting in controlling the nuisance vegetation. This results in a slow release of nutrients from the decaying plants, reducing the potential for increases in nutrients that can cause algae blooms. Removal of the excessive growth of aquatic vegetation will contribute to improved water circulation and a reduction in the potential for anoxic conditions. The post-treatment decrease in plant biomass will help to decrease the rate of eutrophication currently caused by the decomposing of excessive plant material.

Protection of fisheries and shellfisheries – Contiguous, dense beds of aquatic vegetation provide poor habitat for most species of fish. Dense plant cover frequently results in significant diurnal fluctuations in dissolved oxygen as well as oxygen depletion during certain times of the year. While temporary effects on some desirable submersed and floating-leaved species may occur following the application of an aquatic herbicide, non-target plants typically rebound quickly. Shoreline emergent plants will not be impacted following the use of aquatic herbicides.

Protection of wildlife and wildlife habitat – In general, excessive and abundant plant growth provides poor wildlife habitat for fish and other wildlife. The proposed management plan is expected to help prevent further degradation of the waterbody through excessive weed

growth and improve the wildlife habitat value of the pond in the long-term. Maintaining a balance of open water and vegetated areas is intended.