AQUATIC CONTROL TECHNOLOGY
POND AND LAKE MANAGEMENT SPECIALISTS

February 28, 2013

Town of Pembroke
c/o Mr. Edwin Thorn, Town Manager
100 Center Street
Pembroke, MA 02359

Re: 2013 Proposal/Agreement for the Continuation of a Nuisance Algae Control Program at Oldham Pond – Pembroke, MA

Dear Mr. Thorn:

Last year's low dose alum treatment significantly improved algal growth conditions in Oldham Pond. In fact, the single early season treatment prevented the development of problematic blue-green algae bloom conditions during the recreational season and eliminated the need for additional algae control. Although the alum treatment dramatically improved conditions, the algae sampling data indicates that blue-green algae growth did start increasing in late July as total phosphorus levels began to rebound after the alum treatment. Blue-green algae growth conditions eventually did reach bloom conditions for about a two week period in late August-early September of 2012. Based on these conditions, we feel that incorporating a second low-dose alum treatment some time in mid-July will further reduce nutrient levels over the long-term, improve in-pond algae growth conditions, and prevent late season blue-green blooms from occurring. For these reasons we are recommending that this approach be adopted in 2013.

Please accept the following as our 2013 Proposal/Agreement for the blue-green algae control program at Oldham Pond.

SCOPE OF SERVICES

Permitting
Aquatic Control will also prepare and file for the required MA DEP permits as soon as authorization to proceed is received.

Algae Monitoring
An Aquatic Control Biologist will plan to perform a brief inspection of the Oldham Pond in mid-late May to identify specific sample collection sites. Also at the time of the site visit a meeting with PWA members will be scheduled so that the algae sampling site methods and protocols for collecting algae analysis can be reviewed with Association volunteers. A single water sample will be collected weekly by PWA members from a single sample site over the course of 15 weeks (total of 15 sample from May-September), along with collecting Secchi depth at each of the sample collection sites (ACT, Inc. will provide sample bottles). The collected samples are to be refrigerated and shipped via overnight mail (on the day of collection) to Water Resource Services (WRS) in Wilbraham, MA.

If and/or when the initial algae bloom develops an Aquatic Control Biologist will inspect the bloom conditions and collect a sample for algae toxin testing. This analysis will be performed by an independent certified laboratory.

Once the samples are received by WRS, the microscopic algae species will be identified and general abundance determined. This data along with the reported water clarity readings will be

used as a basis to determine the need for and/or timing of Phycomycin treatments in Oldham Pond.

Water quality Monitoring
PWA volunteers will be required to collect monthly water quality samples at Oldham. Parameters to be tested will focus on those that are apt to be most affected by the application of Phycomycin. These parameters will include temperature, dissolved oxygen, and Secchi depth. Results of this testing will need to be forwarded to Aquatic Control promptly following collection.

In addition to this routine water quality monitoring to be performed by the Association, Aquatic Control will collect Secchi depth, temperature and dissolved oxygen profiles immediately prior to any Phycomycin treatments. The pH will also be monitored within the treatment area throughout the application process (pre, mid, and post-treatment).

Phosphorus Inactivation
During the early growing (late May-early June) season before abundant algae growth becomes established, Aquatic Control's MA licensed pesticide applicators will perform a low-dose (~1ppm) alum treatment over the entire pond. The treatment will be performed over the course of two days using specially equipped treatment boats that will spray the alum into the boat's propwash for flash-mixing in the water column. pH will be monitored throughout the application process to ensure the maintenance of a stable pH to facilitate proper complexation of phosphorus and minimal impacts to non-target organisms.

A second low dose alum treatment will be performed approximately 6 weeks after the initial alum treatment. Treatment dose and areas will be dictated by the water quality sampling results. The application of the alum will be performed in the same manor as the initial treatment.

Algae Control/Treatment
In the event that elevated algae densities develop following the two alum treatments, a treatment area of roughly 1/2 of the pond area will be designated for Phycomycin treatment. A Phycomycin dose of approximately 120 lbs/ac. will be applied over the designated treatment area. The algaecide will be applied using a shallow draft jon boat equipped with GPS to aid in the even application of the product over the designated treatment area. The phycomycin will be applied using venturi eductor system designed to deliver the Phycomycin granules to the pond using a pressurized stream of pond water. This treatment methodology will aid in the rapid dissolution of the Phycomycin granule once applied to the pond.

Mussel Monitoring
A survey of resident mussels will be performed by a qualified mussel biologist in and adjacent to identified treatment areas. Areas supporting state listed mussels will be marked so that the same approved biologist can monitor the mussels following the Phycomycin treatment program. The selected and approved biologist will also obtain a *Scientific Collection Permit* for this work. Aquatic Control is not staffed to be able to perform this work; therefore, this work will be sub-contracted to Biodrawversity, LLC, which is the same firm that performed all prior mussel survey work at the site.

TENTATIVE SCHEDULE OF PERFORMANCE

- Permitting ..... February
- Pre-treatment inspection..... early-mid May
- Initial low-dose alum treatment .....late May-early June
- Algal monitoring.....May – September
- Follow-up low-dose alum treatment .....mid July
- Algal treatment (1/3 of the pond) .....late May –late August (Date TBD)
- Year-End Report..... December

INSURANCE

Aquatic Control carries workmen's compensation, property damage and liability insurance which will remain in effect throughout the duration of this Agreement (December 31, 2013). A "certificate of insurance" will be provided to the Town and/or Association upon request.

CLIENT (PWA & Town of Pembroke) RESPONSIBILITIES

- Full compliance with the Pembroke and Hanson Conservation Commission's, Order of Conditions (OOC) permit for this project, and DEP pesticide use permit unless otherwise agreed to in writing by ACT.
- Collection of weekly surface grab algae samples and other water quality monitoring data at Oldham Pond and prompt overnight shipping of samples to WRS office.
- All pre-treatment notifications of pending chemical treatments. ACT to provide a written "notice of treatment" for distribution to local media outlets, if desired. Posting of pond shoreline in advance of scheduled treatments, ACT to provide posters.
- Full agreement from any cranberry bog owners to cease their use of pond water for irrigation and other purposes on the day of algaecide treatment.
- Posting of pre-printed signs around the entire Oldham Pond shoreline prior to Phycomycin treatments. ACT to provide the signs and posting instructions.
- Compliance/enforcement (to the extent possible) of the temporary water use restrictions to be imposed post-treatment.

COST AND PAYMENT SCHEDULE

***Permitting* (ESTIMATE)**	
▪ Prepare and file required MA DEP *License to Apply Chemicals* permit	$300
Permitting Total	***$300***

Algae Monitoring	
▪ ID species and relative abundance of weekly algae samples (15 samples @ $170/sample)	$2,550
▪ Toxic algae testing (sample collection & analysis – one sample @ $500/sample)	$500
Algae Monitoring Total	***$3,050***

Mussel Monitoring	
▪ Pre-Treatment identification of rare mussel species within and near treatment areas	$2,950
▪ Post-treatment monitoring of rare mussels within designated areas	$2,950
Algae Monitoring Total	***$5,900***

In-Pond Algae Management	
▪ Whole Pond low-dose alum treatment (~1ppm) performed over the course of two days (cost includes all materials, labor, equipment for treatment, and monitoring)	$28,750
▪ Area selective follow-up low-dose alum treatment (cost includes all materials, labor, equipment for treatment, and monitoring)	$17,500
CONTINGENT PHYCOMYCIN TREATMENTS	
▪ One follow-up treatment of a approximately 1/2 of the pond (~100 acres) with Phycomycin algaecide (cost includes all materials, labor, and equipment for treatment) - $17,000/treatment	$17,000
In-Pond Algae Management Total	***$63,250***

Project Reporting	
▪ Algae sample data tabulation, interpretation, and reporting	$1,000
▪ Final project completion report	$850
Algae Monitoring Total	***$1,850***

TOTAL MONITORING & CONTROL PROGRAM COST	**$57,350-$74,350**

As in the past invoices will be submitted upon completion of the various program tasks, payment will be due, in full, within 30 days of the issuance of each invoice.

Specific, mutually agreeable date(s) for chemical treatment will be scheduled with the Town and Association representatives in advance. Our ability to proceed with this management program is contingent upon timely receipt of the required DEP permit. **In order to file your DEP permit in a timely manner it is important that this proposal be signed and returned as soon as possible or before March 16, 2013.** The costs outlined above will remain valid for a period of 90 days from the date of the proposal. In the meantime, if you have any questions or require additional information, please do not hesitate to contact Keith Gazaille or me.

Sincerely,

Aquatic Control Technology

Marc D. Bellaud
President/Aquatic Biologist

Accepted By: **Town of Pembroke**

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(sign name)

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(print name)

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(date)