

# **Monponsett Ponds Remediation Program: West Monponsett Pond Nutrient Management Project**

**FFY 17 Section 319 Nonpoint Source Pollution  
Competitive Grants Program  
RFR #: BRP 2016-08**



**Town of Halifax, Massachusetts  
June 2016**

## ATTACHMENT B

### PROPOSAL CHECKLIST FOR FFY 2017 NONPOINT SOURCE COMPETITIVE GRANTS

Use this checklist when reviewing the proposal package to ensure that it meets the minimum format requirements.

#### COMPLETED ADMINISTRATIVE SUMMARY

- ☒ Applicant and contact information
- ☒ Project Title
- ☒ Watershed(s)/Subwatershed(s) served by this project
- ☒ Project type(s)
- ☒ Amount of funding requested
- ☒ Details, amount, and percent of match funding proposed
- ☒ Project summary/objectives
- ☒ Principal contact name and contact information
- ☐ Authorized Signature

#### PROJECT DESCRIPTION

- ☒ Concise statement of the problem
- ☒ Targeted pollutant(s) and estimated pollutant removal (implementation projects)
- ☒ Project goals(s)
- ☒ Project strategy
- ☒ Milestones
- ☒ Activities
- ☒ Project evaluation - environmental indicators
- ☒ Outreach - Technology transfer

#### SCOPE OF SERVICES

- ☒ Objectives/tasks
- ☒ Deliverables
- ☒ Estimated costs

#### PROJECT BUDGET

#### PROJECT MILESTONE SCHEDULE

#### PROPOSAL ATTACHMENTS

- ☒ Proposal backup data
- ☐ Conceptual design(s)
- ☒ Maps, locus and BMP location(s)
- ☐ Letters of support from all organizations providing match funds
- ☐ Documentation of property ownership and permission for BMP installation
- ☒ Statement of Qualifications, resumes of key personnel

#### CONTRACTUAL FORMS

- ☒ Written Statement of Intent acknowledging the obligation to meet or exceed fair share goals
- ☒ An executed Equal Opportunity/Affirmation Action Policy Statement
- ☒ Commonwealth Terms and Conditions
- ☒ Standard Contract Form
- ☒ Contractor Authorized Signature Verification Form and authorization documentation
- ☒ Consultant Contractor Mandatory Submission Form (Required only for Private Organizations)
- ☒ Completed and signed W-9 Form

**RESPONSE FORM**  
**319 NONPOINT SOURCE POLLUTION GRANT PROGRAM**  
**4/01/16**  
**BRP-RFR-2016-08-319**  
**Administrative Summary**

**RESPONDENT** – Town of Halifax, Massachusetts

**Address** – Board of Health  
499 Plymouth Street  
Halifax, MA 02338

**Telephone** - 781-293-6768

**Facsimile** -781-293-1738

**Email Address** – cdrinan@town.halifax.ma.us

**PROJECT TITLE** – Monponsett Watershed Remediation Program: West Monponsett Pond Nutrient Management Project

**WATERSHED(S)/SUBWATERSHED(S) SERVED BY THIS PROJECT** - West Monponsett Pond / Taunton Watershed

**PROJECT TYPE(s)** - see Section 3. A response may encompass more than one project type.

- ☒ **A. Implementation**      ☐ TMDL      ☒ Category 4a or 5      ☐ other  
☒ **Continues the work commenced under publicly funded program(s):** Sustainable Water Management Initiative (SWMI) (2013 and 2015) grants, Division of Ecological Restoration recognition of Stump Brook and the Monponsett Ponds as a Priority Project, EPA Watershed Management Optimization Support Tool (WMOST) Modeling (2014) grant, New England Interstate Water Pollution Control Commission (NEIWPCC) for Stormwater Assessment, Prioritization and Preliminary Designs (2016).  
☐ **B. Healthy Watersheds**  
☐ **C. Outreach and Education**  
☐ **D. Stormwater Utility Development**

**POLLUTANT(S) OF CONCERN:** Phosphorus

**AMOUNT OF FUNDING REQUESTED AND AMOUNT AND PERCENT OF MATCH FUNDING PROPOSED -**

Federal Funds via MassDEP	\$ <u>105,000</u>	
Non-Federal Match	\$ <u>70,000</u>	% of Total Budget <u>40%</u>
Total Project Budget	\$ <u>175,000</u>	

**PROJECT SUMMARY/OBJECTIVES** - The Monponsett Ponds, consisting of West Monponsett Pond and East Monponsett Pond, are located in Halifax and Hanson, MA (see Figure 1). The ponds stagnant waters, warm water temperatures and high nutrient content makes it very susceptible to cyanobacteria toxin blooms. Cyanobacteria blooms in the pond have resulted in multiple beach closures and serious health concerns. In 2014, Monponsett Ponds and Stump Brook received priority project status as sponsored by the Massachusetts Division of Ecological Restoration (DER). The objective of this project is to reduce the concentration of blue green algae that produce dangerous toxins which have been linked to serious health effects including skin rashes, gastric distress and respiratory problems through aluminum sulfate (alum) treatment which will remove phosphorus from the water column and improve water quality.

**PRINCIPAL CONTACT (Project Manager)**

Cathleen Drinan, Health Agent

Name and Title

(781) 293-6768

Telephone

cdrinan@town.halifax.ma.us

Email

(781) 293-1738

Facsimile

**AUTHORIZED SIGNATORY** - All respondents must complete, execute and return the **CONTRACTOR AUTHORIZED SIGNATURE VERIFICATION FORM** attached to this RFR (see Attachment A).

**RESPONSE**  
**319 NONPOINT SOURCE POLLUTION GRANT PROGRAM**  
**4/01/16**  
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**Implementation Project Description**  
**Adapt as necessary for other project types**

Provide a brief project description. This description may be in narrative form (no more than three [3] pages total) or in the table format shown below.

<b>Element</b>	<b>Definition</b>
<b>CONCISE STATEMENT OF THE PROBLEM</b>	Description of the problem/issue, statement of need, project type, background and overall project justification. Identify and provide data (or summary) and sources of information that define the problem and support the need for the project.
<b>PROJECT GOAL(s)</b>	Specify the goals and anticipated environmental results of the project.
<b>TARGETED POLLUTANT(S) AND WATERBODY(S)</b>	Specify the targeted waterbody(s) and the pollutant(s) that are targeted by the project, if any
<b>ESTIMATED QUANTITY OF POLLUTANT(S) TO BE REMOVED</b>	Estimated quantities to be removed (pounds, tons, CFUs) for all targeted pollutants, if any, based on modeling, demonstration, or other best estimate. Percentages are not acceptable.
<b>PROJECT STRATEGY</b>	Strategy to achieve the project. Describe the steps that will be taken to achieve project goals, and explain how the tasks and sequence will achieve those goals. Identify and describe the participation and commitment expected from other agencies and organizations. Describe the role(s) of each group, and list the specific responsibilities of each. Letters of support from all organizations providing non-federal match must be submitted with the response.
<b>NPDES STATUS</b>	State whether the project is fully or partially in a NPDES area. If so, explain how your project avoids responding to current or future permit requirements.
<b>MILESTONES</b>	In the Project Milestone section, identify the steps that track progress towards meeting a goal.
<b>ACTIVITIES</b>	In the Scope of Services section, provide a brief descriptive statement for each task/activity to be completed under the project to achieve the stated goals.
<b>PROJECT EVALUATION -ENVIRONMENTAL INDICATORS</b>	Description of how the project's accomplishments will be evaluated. The evaluation method selected must fit the project.
<b>OUTREACH- TECHNOLOGY TRANSFER</b>	For Implementation projects, provide a description of the proposed outreach/technology transfer task(s), the participants in the program, and the intended audience. For Outreach and Education projects, this may be described under "Project Strategy."

## Concise Statement of the Problem

The Monponsett Ponds, consisting of West Monponsett Pond and East Monponsett Pond, are located in Halifax and Hanson, MA (see Figure 1). The pond is bordered by residential development to the South and East, active cranberry bogs to the West and undeveloped wetlands/swamps to the North. The ponds are relatively shallow (approximately 13 feet at the deepest) water bodies that serve several public interests including water supply, fisheries and wildlife habitat (including habitat for three state-listed species), flood control and recreation. Historically, the pond has been a popular location for boating and fishing.

The stagnant waters in the ponds combined with the warm water temperatures and high nutrient content make them very susceptible to cyanobacteria toxin blooms. Cyanobacteria blooms in the pond have resulted in multiple beach closures and serious health concerns. High concentrations of this type of algae have been linked with multiple health effects including skin rashes, gastric distress and respiratory problems. Recent publications (Scientific American, March 24, 2016) have linked amyotrophic lateral sclerosis (ALS) and Alzheimer's to cyanobacteria (see Attachment 1 for health related articles).

Since 2008 the Massachusetts Department of Public Health (MDPH) has issued multiple public health advisories for the pond, forcing the Town to close the beaches to swimming and boating. In 2013 the Monponsett Ponds held the record of longest consecutive beach closures in Commonwealth history, based on MDPH sampling results.

The Pond is currently listed on the Massachusetts 2014 Integrated List of Waters (303d list) as a "Category 5" water body, meaning that it is impaired or threatened for one or more uses and the state is required to develop a Total Maximum Daily Load (TMDL) for the waterbody. The causes of impairment are attributed to excess algal growth, phosphorus (total), taste and odor and proliferation of non-native aquatic species (see Attachment 2 for excerpt).

The pond is also identified as an area of Priority Habitat for Rare Species and Estimated Habitat for Rare Species by the Massachusetts Division of Fisheries and Wildlife for the following three state-listed species of special concern:

- Tidewater Mucket (*Leptodea ochracea*)
- Eastern Pondmussel (*Ligumia nasuta*)
- Umber Shadowdragon (*Neurocordulia obsoleta*)

## Project Goals

The goal of this project is to reduce the concentration of blue green algae that produce dangerous toxins which have been linked to serious health effects including skin rashes, gastric distress and respiratory problems using a methodology that protects the habitat of the state-listed species of special concern. The project goals align with the previous grants that have been awarded to the Town of Halifax that include multiple Sustainable Water Management Initiative (SWMI) grants in 2013 and 2015, EPA Watershed Management Optimization Support Tool (WMOST) modeling in 2014, Division of Ecologic Restoration Priority Project Status in 2014, and most recently an award from the New England Interstate Water Pollution Control Commission. All of these grants have focused on improving the health of this waterbody; see the "Watershed Tour 3-25-16" Summary document developed by the Town's Health Agent for additional information (included in Attachment 3).

### **Targeted Pollutants and Waterbody**

The targeted waterbody is West Monponsett Pond and the targeted pollutant is phosphorus.

### **Estimated Quantity of Pollutant(s) to Be Removed**

The 2015 alum treatment program resulted in a 50% reduction in total phosphorus (TP) levels within West Monponsett Pond from 46 parts per billion (ppb) in June 2015 to 26 ppb in July 2015. The 2016 proposed alum treatment program has been modified in order to better bind available phosphorus and further reduce seasonal algae production. The goal of the treatment modifications is to reduce phosphorus concentrations below 30 ppb in the month of June in order to prevent the establishment of cyanobacteria growth prior to its growing season.

### **Project Strategy**

The goal of the alum treatment is to remove phosphorus from the water column through the application of a low dose of aluminum sulfate (alum). Due to the poor buffering capacity of the pond sodium aluminate will be simultaneously applied during the treatment in order to maintain a proper pH in the pond during the treatment. Three low-dose buffered alum treatments will be applied to the pond in late-April/early-May, early-mid June and mid-late July. The Town initiated alum treatments to reduce the phosphorus in the pond in 2013. The results of each year of treatment are used to optimize the treatment for the subsequent year. The project as proposed includes two phases in two years of buffered alum treatment. SOLitude Lake Management's proposal for the 2016 West Monponsett Pond Nutrient Management Contract is included in Attachment 4. The qualifications of both GHD Inc. (the Town's engineer) and SOLitude are also included in Attachment 4. GHD Inc. will be responsible for grant reporting, public participation and outreach, and overall project management.

SOLitude Lake Management has already prepared and filed a *License to Apply Chemicals* permit with MassDEP for the application of aluminum sulfate and sodium aluminate to the pond. The Orders of Conditions (OOC) from the Hanson and Halifax Conservation Commissions issued for the nutrient management program at West Monponsett Pond remain valid until 2019.

A letter of support from State Representative Thomas J. Calter is attached to this application as well as evidence of public support for the project. Additional Letters of Support will follow under a separate cover by the deadline specified in the grant announcement.

### **NPDES Status**

As shown in the attached figure section, the project is not located in a NPDES regulated area.

### **Milestones**

See the attached "Project Milestone" section.

### **Activities**

See the attached "Scope of Services" section.

### **Project Evaluation – Environmental Indicators**

The 'Revised Habitat Management Plan for Phosphorus Inactivation in the Western Basin of Monponsett Pond' was submitted to the Massachusetts Division of Fisheries and Wildlife (DFW) Natural Heritage and Endangered Species Review Program (NHESP) and approved in May 2015 (see Attachment 5 of this grant application, Appendix A of the Final Report). The plan outlines monitoring to be performed to assess the

effectiveness of the alum treatment.

The following monitoring program will be conducted during the course of the 2016 alum treatment:

- Eighteen water quality samples (3 samples once per month April – September) analyzed for phosphorus, pH, alkalinity and turbidity
- Six algae samples (1 sample per month April – September) for species identification and general abundance/dominance

Once the alum treatment program has been completed a final written report will be developed providing an evaluation of the results of the mussel, water quality, and algae monitoring program; and the results of the treatment. The 2015 Year-End Alum Treatment Report 2015 from SOLitude is included in Attachment 5.

The same monitoring program and a final written report will also be developed for the second phase of treatment.

(The Town has been working with SOLitude Lake Management since 2013. SOLitude acquired Aquatic Control Technologies within the last year, and Aquatic Control Technologies acquired Lycott Environmental in previous years. The same Senior Biologist has been employed throughout the transition of firms and has been working on each previous annual alum treatment for West Monponsett Pond).

#### **Outreach – Technology Transfer**

Updates and results of the alum treatment program will be shared with the public during Board of Selectmen Meeting(s) and through presentations during Monponsett Watershed Association (MWA) Meetings. The MWA is an all-volunteer community group that was formed by abutting property owners, residents and concerned citizens and is committed to the maintenance and preservation of the Monponsett Ponds. The mission of the MWA is “to educate the public and to restore and preserve the Monponsett Ponds consisting of the West Monponsett Pond and the East Monponsett Pond hereinafter referred to as Monponsett Ponds for clean water and safe recreational use.”

Additionally an educational flyer will be developed and distributed as part of this project. The flyer will be a one page double-sided document that will include a project summary, background of the project and project timeline. Copies will be made available at Town Hall and at the Board of Health.



**RESPONSE**  
**319 NONPOINT SOURCE POLLUTION GRANT PROGRAM**

4/01/16

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**Scope of Services**

Provide a brief descriptive statement for each task/activity to be completed under the project, and list and describe the product(s) for each task. Provide an estimated cost for each task. NOTE: Every Implementation proposal must list as a separate task an Outreach and Education task for the project. Every Implementation project must include the development and implementation of an Operation and Maintenance Plan as a separate task. Finally, every response must include reporting requirements (quarterly updates, final project reports, etc.) as a separate task. Attach additional pages as required to describe objectives/tasks.

**TASK/OBJECTIVE # 1: Project Evaluation:**

As required, estimated quantity of pollutant load removal to be achieved (if applicable). Most projects are assumed to be covered under the MassDEP 319 Programmatic QAPP. For TMDL development or if the project relies on a separate MassDEP- and EPA-approved Quality Assurance Project Plan, explain why this is a necessary component of the proposed work.

DELIVERABLES: Monitoring to be performed in accordance with the May 2015 Massachusetts Division of Fisheries and Wildlife (DFW) Natural Heritage and Endangered Species Review Program (NHESP) approved "Revised Habitat Management Plan for Phosphorus Inactivation in the Western Basin of Monponsett Pond."

Cost included in Task/Objective #5.

ESTIMATED COST: \$0 s.319 SHARE: \$0 NON-FEDERAL MATCH SHARE AND SOURCE: \$0

**TASK/OBJECTIVE #2: Permitting**

Coordination with the local Conservation Commissions (Hanson and Halifax). A valid Order of Conditions (OOC) for the nutrient management program at West Monponsett Pond remains valid until 2019.

DELIVERABLES: Order of Conditions

ESTIMATED COST: \$500 s.319 SHARE: \$300 NON-FEDERAL MATCH SHARE AND SOURCE: \$200 (Town funded)

**TASK/OBJECTIVE #3: 1<sup>st</sup> Phase Buffered Alum Treatments and Project Reporting**

Perform three low-dose buffered alum treatments spaced approximately one month to six weeks apart (late April-early May, early-mid June, mid-late July).

- Initial aluminum sulfate and sodium aluminate treatment targeting an aluminum dose of approximately 1.5 ppm throughout all areas greater than 4 ft. in depth (approximately 235 acres).
- (2) follow-up lower dose buffered alum treatments targeting an aluminum dose of approximately 0.75 ppm.

A final written report will be developed that outlines the treatment tasks performed. The report will also provide an evaluation of the results of the mussel, water quality and algae monitoring. These results will then be used to evaluate the efficacy of the program and the feasibility of possible improvements/modifications to the 2<sup>nd</sup> Phase Treatment

DELIVERABLES: Final Report developed by SOLitude

ESTIMATED COST: \$66,800    s.319 SHARE: \$40,080    NON-FEDERAL MATCH SHARE AND SOURCE: \$26,720 (Town funded)

**TASK/OBJECTIVE #4: 2<sup>nd</sup> Phase Buffered Alum Treatments and Project Reporting**

Perform three low-dose buffered alum treatments spaced approximately one month to six weeks apart (late April-early May, early-mid June, mid-late July).

- Initial aluminum sulfate and sodium aluminate treatment targeting an aluminum dose of approximately 1.5 ppm throughout all areas greater than 4 ft. in depth (approximately 235 acres).
- (2) follow-up lower dose buffered alum treatments targeting an aluminum dose of approximately 0.75 ppm.

A final written report will be developed that outlines the treatment tasks performed. The report will also provide an evaluation of the results of the mussel, water quality and algae monitoring. These results will then be used to evaluate the efficacy of the program and the feasibility of possible improvements/modifications.

DELIVERABLES: Final Report developed by SOLitude

ESTIMATED COST: \$71,800    s.319 SHARE: \$43,080    NON-FEDERAL MATCH SHARE AND SOURCE: \$28,720 (Town funded)

**TASK/OBJECTIVE #5: Water Quality Monitoring**

SOLitude will perform all of the NHESP required monitoring outlined in the approved REVISED Management Plan (Attachment 5 (Appendix A) of this grant application).

- Short-term mussel monitoring
- (18) water quality samples (3 samples once per month April – September) analyzed for phosphorus, pH, alkalinity and turbidity
- (6) algae samples (1 sample per month April – September) for species identification and general abundance/dominance.

DELIVERABLES: Final Report developed by SOLitude (referenced also in Task/Objective #3 and #4)

ESTIMATED COST: \$15,150    s.319 SHARE: \$9,090    NON-FEDERAL MATCH SHARE AND SOURCE: \$6,060 (Town funded)

**TASK/OBJECTIVE #6: Grant Management**

Submit reports detailing the activities that have taken place, the effort expended to date and next steps. This task shall also include the development of the draft final report and final report.

DELIVERABLES: Quarterly Reports, quarterly submittals, DBE utilization reports, Draft Final Report and Final Report.

ESTIMATED COST: \$10,000    s.319 SHARE: \$6,000    NON-FEDERAL MATCH SHARE AND SOURCE: \$4,000 (Town funded)

**TASK/OBJECTIVE #7: Outreach and Education**

Updates and results of the alum treatment program will be shared with the public during Board of Selectmen Meeting(s) and through presentations during Monponsett Watershed Association (MWA) Meetings. The MWA is an all-volunteer community group that was formed by abutting property owners, residents and concerned citizens which is committed to the maintenance and preservation of the Monponsett Ponds.

DELIVERABLES: Public Education Flyer

ESTIMATED COST: \$10,000    s.319 SHARE: \$6,000    NON-FEDERAL MATCH SHARE AND SOURCE: \$4,000 (Town funded)

**TASK/OBJECTIVE #8: Development of an Operation and Maintenance (O&M) Plan**

The final written report developed by SOLitude will serve as the O&M Plan for this project.

DELIVERABLES: Final Report developed by SOLitude (referenced also in Task/Objective #3, #4 and #5)

ESTIMATED COST: \$750 s.319 SHARE: \$450 NON-FEDERAL MATCH SHARE AND SOURCE: \$300

**Repeat this page as necessary to show all proposal tasks**

**RESPONSE**  
**4/01/16**  
**BRP-RFR-2016-08-319**  
**Project Budget**

This budget is for response evaluation purposes. Use the whole dollar method. Indicate which items will be paid for by s.319 funds, and which will be paid for by the non-federal match. Attach additional pages as required. Grant administration costs cannot exceed 10% of the grant award.

Expense Items	s.319 Amount	Non-Federal Match and Source	Total Amount
Salary - By Title and salary range (ex.: Engineer, \$40-50/hr)			
Subcontractual Services – GHD Inc. and SOLitude Lake Management			
- GHD Inc. (Engineering Services) – Tasks 1, 2, 3, 4, 6, 7 & 8	\$18,000	\$12,000 (Town Funded)	\$30,000
- SOLitude Lake Management (Pond Treatment) – Tasks 1, 2, 3, 4 & 5	\$87,000	\$58,000 (Town Funded)	\$145,000
- The Town of Halifax and SOLitude Lake Management will investigate whether the materials for the project can be purchased through a DBE/WBE. The funding requested in this grant is for contractual services to SOLitude which is not a DBE/WBE based company.			
Materials and Supplies (including printing, mailing - should include cost for printing five copies and two CDs of the final project report, with photographs) <b>**Cost included in Subcontractual Services Above**</b>			
Travel (for auto mileage only @ \$.45 /mile) <b>**Cost included in Subcontractual Services Above**</b>			
Other			
Totals:	\$105,000	\$70,000	\$175,000

**REQUIRED: SOURCE(S) OF NON-FEDERAL MATCH** - List all sources of non-federal match funds and the amount of matching funds being contributed by each source. Letters of support from all organizations (on the organization's letterhead) identified as providing a portion of the non-federal match for the project **must be submitted with the response**. These letters must detail the match to be provided by the organization, and must be signed by an authorized signatory for the organization.

**EEO/AA REQUIREMENTS** - Identify all budget categories from which it is anticipated that the DBE participation goals will be met. Show the anticipated dollar amount of DBE participation in each budget category.

**RESPONSE**  
**319 NONPOINT SOURCE POLLUTION GRANT PROGRAM**  
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**Project Milestone Schedule**

Provide a time-line by "xing" out the duration of the task activity. Use additional pages as necessary. ~~Presume a February 1, 2017 Notice to Proceed.~~ Please see notes below.

MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15: April 2017	16	17	18	19	20	21	22	23	24
TASK #1																								
TASK #2		X	X											X	X									
TASK #3			X	X	X	X																		
TASK #4															X	X	X	X						
TASK #5			X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	
TASK #6			X			X			X			X			X			X			X	X	X	X
TASK #7			X				X												X					X
TASK #8																						X	X	

Notes:

- (1) Town of Halifax is starting Phase 1 during spring 2016 due to water quality concerns and will use this as their reimbursement if accepted.
- (2) Months "3-4-5-6" represents April-May-June-July 2016 for this application.

## **Required Forms**

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## COMMONWEALTH OF MASSACHUSETTS ~ STANDARD CONTRACT FORM



This form is jointly issued and published by the Executive Office for Administration and Finance (ANF), the Office of the Comptroller (CTR) and the Operational Services Division (OSD) as the default contract for all Commonwealth Departments when another form is not prescribed by regulation or policy. Any changes to the official printed language of this form shall be void. Additional non-conflicting terms may be added by Attachment. Contractors may not require any additional agreements, engagement letters, contract forms or other additional terms as part of this Contract without prior Department approval. Click on hyperlinks for definitions, instructions and legal requirements that are incorporated by reference into this Contract. An electronic copy of this form is available at [www.mass.gov/osc](http://www.mass.gov/osc) under Guidance For Vendors - Forms or [www.mass.gov/osd](http://www.mass.gov/osd) under OSD Forms.

<b>CONTRACTOR LEGAL NAME:</b> (and d/b/a): Town of Halifax		<b>COMMONWEALTH DEPARTMENT NAME:</b> MMARS Department Code:	
<b>Legal Address: (W-9, W-4, T&amp;C):</b> 499 Plymouth Street, Halifax MA 02339		<b>Business Mailing Address:</b>	
<b>Contract Manager:</b> Charlie Seelig, Town Administrator		<b>Billing Address (if different):</b>	
<b>E-Mail:</b> cseelig@town.halifax.ma.us		<b>Contract Manager:</b>	
<b>Phone:</b> 781-293-1723	<b>Fax:</b> 781-294-7684	<b>E-Mail:</b>	
<b>Contractor Vendor Code:</b> VC6000191812		<b>Phone:</b>	<b>Fax:</b>
<b>Vendor Code Address ID (e.g. "AD001"):</b> AD		<b>MMARS Doc ID(s):</b>	
(Note: The Address ID must be set up for EFT payments.)		<b>RFR/Procurement or Other ID Number:</b>	
<p style="text-align: center;"><b>___ NEW CONTRACT</b></p> <p><b>PROCUREMENT OR EXCEPTION TYPE:</b> (Check one option only)</p> <p><input type="checkbox"/> <u>Statewide Contract</u> (OSD or an OSD-designated Department)</p> <p><input type="checkbox"/> <u>Collective Purchase</u> (Attach OSD approval, scope, budget)</p> <p><input checked="" type="checkbox"/> <u>Department Procurement</u> (includes State or Federal grants 815 CMR 2.00) (Attach RFR and Response or other procurement supporting documentation)</p> <p><input type="checkbox"/> <u>Emergency Contract</u> (Attach justification for emergency, scope, budget)</p> <p><input type="checkbox"/> <u>Contract Employee</u> (Attach <u>Employment Status Form</u>, scope, budget)</p> <p><input type="checkbox"/> <u>Legislative/Legal or Other:</u> (Attach authorizing language/justification, scope and budget)</p>		<p style="text-align: center;"><b>___ CONTRACT AMENDMENT</b></p> <p>Enter Current Contract End Date <u>Prior</u> to Amendment: ____, 20 ____.</p> <p>Enter Amendment Amount \$ _____. (or "no change")</p> <p><b>AMENDMENT TYPE:</b> (Check one option only. Attach details of Amendment changes.)</p> <p><input type="checkbox"/> <u>Amendment to Scope or Budget</u> (Attach updated scope and budget)</p> <p><input type="checkbox"/> <u>Interim Contract</u> (Attach justification for Interim Contract and updated scope/budget)</p> <p><input type="checkbox"/> <u>Contract Employee</u> (Attach any updates to scope or budget)</p> <p><input type="checkbox"/> <u>Legislative/Legal or Other:</u> (Attach authorizing language/justification and updated scope and budget)</p>	
<p>The following <b>COMMONWEALTH TERMS AND CONDITIONS</b> (T&amp;C) has been executed, filed with CTR and is incorporated by reference into this Contract.</p> <p><input checked="" type="checkbox"/> Commonwealth Terms and Conditions <input type="checkbox"/> Commonwealth Terms and Conditions For Human and Social Services</p>			
<p><b>COMPENSATION:</b> (Check ONE option): The Department certifies that payments for authorized performance accepted in accordance with the terms of this Contract will be supported in the state accounting system by sufficient appropriations or other non-appropriated funds, subject to intercept for Commonwealth owed debts under 815 CMR 9.00.</p> <p><input type="checkbox"/> <u>Rate Contract</u> (No Maximum Obligation. Attach details of all rates, units, calculations, conditions or terms and any changes if rates or terms are being amended.)</p> <p><input checked="" type="checkbox"/> <u>Maximum Obligation Contract</u> Enter Total Maximum Obligation for total duration of this Contract (or new Total if Contract is being amended). \$ _____.</p>			
<p><b>PROMPT PAYMENT DISCOUNTS (PPD):</b> Commonwealth payments are issued through <u>EFT</u> 45 days from invoice receipt. Contractors requesting accelerated payments must identify a PPD as follows: Payment issued within 10 days __% PPD; Payment issued within 15 days __% PPD; Payment issued within 20 days __% PPD; Payment issued within 30 days __% PPD. If PPD percentages are left blank, identify reason: <input checked="" type="checkbox"/> agree to standard 45 day cycle __ statutory/legal or Ready Payments (<u>G.L. c. 29, § 23A</u>); __ only initial payment (subsequent payments scheduled to support standard EFT 45 day payment cycle. See Prompt Pay Discounts Policy.)</p>			
<p><b>BRIEF DESCRIPTION OF CONTRACT PERFORMANCE or REASON FOR AMENDMENT:</b> (Enter the Contract title, purpose, fiscal year(s) and a detailed description of the scope of performance or what is being amended for a Contract Amendment. Attach all supporting documentation and justifications.)</p> <p>Contract for Bid #BRP-RFR-2016-08-319 – West Monponsett Pond Nutrient Management Project</p>			
<p><b>ANTICIPATED START DATE:</b> (Complete ONE option only) The Department and Contractor certify for this Contract, or Contract Amendment, that Contract obligations:</p> <p><input checked="" type="checkbox"/> 1. may be incurred as of the <u>Effective Date</u> (latest signature date below) and <u>no</u> obligations have been incurred <u>prior</u> to the <u>Effective Date</u>.</p> <p><input type="checkbox"/> 2. may be incurred as of ____, 20 ____, a date <u>LATER</u> than the <u>Effective Date</u> below and <u>no</u> obligations have been incurred <u>prior</u> to the <u>Effective Date</u>.</p> <p><input type="checkbox"/> 3. were incurred as of ____, 20 ____, a date <u>PRIOR</u> to the <u>Effective Date</u> below, and the parties agree that payments for any obligations incurred prior to the <u>Effective Date</u> are authorized to be made either as settlement payments or as authorized reimbursement payments, and that the details and circumstances of all obligations under this Contract are attached and incorporated into this Contract. Acceptance of payments forever releases the Commonwealth from further claims related to these obligations.</p>			
<p><b>CONTRACT END DATE:</b> Contract performance shall terminate as of ____, 20 ____, with no new obligations being incurred after this date unless the Contract is properly amended, provided that the terms of this Contract and performance expectations and obligations shall survive its termination for the purpose of resolving any claim or dispute, for completing any negotiated terms and warranties, to allow any close out or transition performance, reporting, invoicing or final payments, or during any lapse between amendments.</p>			
<p><b>CERTIFICATIONS:</b> Notwithstanding verbal or other representations by the parties, the "Effective Date" of this Contract or Amendment shall be the latest date that this Contract or Amendment has been executed by an authorized signatory of the Contractor, the Department, or a later Contract or Amendment Start Date specified above, subject to any required approvals. The Contractor makes all certifications required under the attached <u>Contractor Certifications</u> (incorporated by reference if not attached hereto) under the pains and penalties of perjury, agrees to provide any required documentation upon request to support compliance, and agrees that all terms governing performance of this Contract and doing business in Massachusetts are attached or incorporated by reference herein according to the following hierarchy of document precedence, the applicable <u>Commonwealth Terms and Conditions</u>, this Standard Contract Form including the <u>Instructions and Contractor Certifications</u>, the Request for Response (RFR) or other solicitation, the Contractor's Response, and additional negotiated terms, provided that additional negotiated terms will take precedence over the relevant terms in the RFR and the Contractor's Response only if made using the process outlined in <u>801 CMR 21.07</u>, incorporated herein, provided that any amended RFR or Response terms result in best value, lower costs, or a more cost effective Contract.</p>			
<p><b>AUTHORIZING SIGNATURE FOR THE CONTRACTOR:</b></p> <p>X: <u>Kim Roy</u> Date: <u>May 15 2016</u></p> <p>(Signature and Date Must Be Handwritten At Time of Signature)</p> <p>Print Name: Kim Roy,</p> <p>Print Title: <u>Chair, Board of Selectmen</u></p>		<p><b>AUTHORIZING SIGNATURE FOR THE COMMONWEALTH:</b></p> <p>X: _____ Date: _____</p> <p>(Signature and Date Must Be Handwritten At Time of Signature)</p> <p>Print Name: _____</p> <p>Print Title: _____</p>	



# COMMONWEALTH OF MASSACHUSETTS ~ STANDARD CONTRACT FORM



## INSTRUCTIONS AND CONTRACTOR CERTIFICATIONS

The following instructions and terms are incorporated by reference and apply to this Standard Contract Form. Text that appears underlined indicates a "hyperlink" to an Internet or bookmarked site and are unofficial versions of these documents and Departments and Contractors should consult with their legal counsel to ensure compliance with all legal requirements. Using the Web Toolbar will make navigation between the form and the hyperlinks easier. Please note that not all applicable laws have been cited.

**CONTRACTOR LEGAL NAME (AND D/B/A):** Enter the Full Legal Name of the Contractor's business as it appears on the Contractor's W-9 or W-4 Form (Contract Employees only) and the applicable Commonwealth Terms and Conditions If Contractor also has a "doing business as" (d/b/a) name, BOTH the legal name and the "d/b/a" name must appear in this section.

**Contractor Legal Address:** Enter the Legal Address of the Contractor as it appears on the Contractor's W-9 or W-4 Form (Contract Employees only) and the applicable Commonwealth Terms and Conditions, which must match the legal address on the 10991 table in MMARS (or the Legal Address in HR/CMS for Contract Employee).

**Contractor Contract Manager:** Enter the authorized Contract Manager who will be responsible for managing the Contract. The Contract Manager should be an Authorized Signatory or, at a minimum, a person designated by the Contractor to represent the Contractor, receive legal notices and negotiate ongoing Contract issues. The Contract Manager is considered "Key Personnel" and may not be changed without the prior written approval of the Department. If the Contract is posted on COMMBUYS, the name of the Contract Manager must be included in the Contract on COMMBUYS.

**Contractor E-Mail Address/Phone/Fax:** Enter the electronic mail (e-mail) address, phone and fax number of the Contractor Contract Manager. This information must be kept current by the Contractor to ensure that the Department can contact the Contractor and provide any required legal notices. Notice received by the Contract Manager (with confirmation of actual receipt) through the listed address, fax number(s) or electronic mail address will meet any written legal notice requirements.

**Contractor Vendor Code:** The Department must enter the MMARS Vendor Code assigned by the Commonwealth. If a Vendor Code has not yet been assigned, leave this space blank and the Department will complete this section when a Vendor Code has been assigned. The Department is responsible under the Vendor File and W-9s Policy for verifying with authorized signatories of the Contractor, as part of contract execution, that the legal name, address and Federal Tax Identification Number (TIN) in the Contract documents match the state accounting system.

**Vendor Code Address ID:** (e.g., "AD001") The Department must enter the MMARS Vendor Code Address ID identifying the payment remittance address for Contract payments, which MUST be set up for EFT payments PRIOR to the first payment under the Contract in accordance with the Bill Paying and Vendor File and W-9 policies.

**COMMONWEALTH DEPARTMENT NAME:** Enter the full Department name with the authority to obligate funds encumbered for the Contract.

**Commonwealth MMARS Alpha Department Code:** Enter the three (3) letter MMARS Code assigned to this Commonwealth Department in the state accounting system.

**Department Business Mailing Address:** Enter the address where all formal correspondence to the Department must be sent. Unless otherwise specified in the Contract, legal notice sent or received by the Department's Contract Manager (with confirmation of actual receipt) through the listed address, fax number(s) or electronic mail address for the Contract Manager will meet any requirements for legal notice.

**Department Billing Address:** Enter the Billing Address or email address if invoices must be sent to a different location. Billing or confirmation of delivery of performance issues should be resolved through the listed Contract Managers.

**Department Contract Manager:** Identify the authorized Contract Manager who will be responsible for managing the Contract, who should be an authorized signatory or an employee designated by the Department to represent the Department to receive legal notices and negotiate ongoing Contract issues.

**Department E-Mail Address/Phone/Fax:** Enter the electronic mail (e-mail) address, phone and fax number of the Department Contract Manager. Unless otherwise specified in the Contract, legal notice sent or received by the Contract Manager (with confirmation of actual receipt) through the listed address, fax number(s) or electronic mail address will meet any requirements for written notice under the Contract.

**MMARS Document ID(s):** Enter the MMARS 20 character encumbrance transaction number associated with this Contract which must remain the same for the life of the Contract. If multiple numbers exist for this Contract, identify all Doc IDs.

**RFR/Procurement or Other ID Number or Name:** Enter the Request for Response (RFR) or other Procurement Reference number, Contract ID Number or other reference/tracking number for this Contract or Amendment and will be entered into the Board Award Field in the MMARS encumbrance transaction for this Contract.

## NEW CONTRACTS (left side of Form):

Complete this section ONLY if this Contract is brand new. (Complete the **CONTRACT AMENDMENT** section for any material changes to an existing or an expired Contract,

and for exercising options to renew or annual contracts under a multi-year procurement or grant program.)

**PROCUREMENT OR EXCEPTION TYPE:** Check the appropriate type of procurement or exception for this Contract. Only one option can be selected. See State Finance Law and General Requirements, Acquisition Policy and Fixed Assets, the Commodities and Services Policy and the Procurement Information Center (Department Contract Guidance) for details.

**Statewide Contract (OSD or an OSD-designated Department).** Check this option for a Statewide Contract under OSD, or by an OSD-designated Department.

**Collective Purchase approved by OSD.** Check this option for Contracts approved by OSD for collective purchases through federal, state, local government or other entities.

**Department Contract Procurement.** Check this option for a Department procurement including state grants and federal sub-grants under 815 CMR 2.00 and State Grants and Federal Subgrants Policy, Departmental Master Agreements (MA). If multi-Department user Contract, identify multi-Department use is allowable in Brief Description.

**Emergency Contract.** Check this option when the Department has determined that an unforeseen crisis or incident has arisen which requires or mandates immediate purchases to avoid substantial harm to the functioning of government or the provision of necessary or mandated services or whenever the health, welfare or safety of clients or other persons or serious damage to property is threatened.

**Contract Employee.** Check this option when the Department requires the performance of an Individual Contractor, and when the planned Contract performance with an Individual has been classified using the Employment Status Form (prior to the Contractor's selection) as work of a Contract Employee and not that of an Independent Contractor.

**Legislative/Legal or Other.** Check this option when legislation, an existing legal obligation, prohibition or other circumstance exempts or prohibits a Contract from being competitively procured, or identify any other procurement exception not already listed. Legislative "earmarks" exempt the Contract solely from procurement requirements, and all other Contract and state finance laws and policies apply. Supporting documentation must be attached to explain and justify the exemption.

## CONTRACT AMENDMENT (Right Side of Form)

Complete this section for any Contract being renewed, amended or to continue a lapsed Contract. All Contracts with available options to renew must be amended referencing the original procurement and Contract doc ids, since all continuing contracts must be maintained in the same Contract file (even if the underlying appropriation changes each fiscal year.) \*See Amendments, Suspensions, and Termination Policy.)

**Enter Current Contract End Date:** Enter the termination date of the Current Contract being amended, even if this date has already passed. (Note: Current Start Date is not requested since this date does not change and is already recorded in MMARS.)

**Enter Amendment Amount:** Enter the amount of the Amendment increase or decrease to a Maximum Obligation Contract. Enter "no change" for Rate Contracts or if no change.

**AMENDMENT TYPE:** Identify the type of Amendment being done. Documentation supporting the updates to performance and budget must be attached. Amendment to Scope or Budget. Check this option when renewing a Contract or executing any Amendment ("material change" in Contract terms) even if the Contract has lapsed. The parties may negotiate a change in any element of Contract performance or cost identified in the RFR or the Contractor's response which results in lower costs, or a more cost-effective or better value performance than was presented in the original selected response, provided the negotiation results in a better value within the scope of the RFR than what was proposed by the Contractor in the original selected response. Any "material" change in the Contract terms must be memorialized in a formal Amendment even if a corresponding MMARS transaction is not needed to support the change. Additional negotiated terms will take precedence over the relevant terms in the RFR and the Contractor's Response only if made using the process outlined in 801 CMR 21.07, incorporated herein, provided that any amended RFR or Response terms result in best value, lower costs, or a more cost effective Contract.

**Interim Contracts.** Check this option for an Interim Contract to prevent a lapse of Contract performance whenever an existing Contract is being re-procured but the new procurement has not been completed, to bridge the gap during implementation between an expiring and a new procurement, or to contract with an interim Contractor when a current Contractor is unable to complete full performance under a Contract.

**Contract Employee.** Check this option when the Department requires a renewal or other amendment to the performance of a Contract Employee.

**Legislative/Legal or Other.** Check this option when legislation, an existing legal obligation, prohibition or other circumstance exempts or prohibits a Contract from being competitively procured, or identify any other procurement exception not already listed. Legislative "earmarks" exempt the Contract solely from procurement requirements, and all other Contract and state finance laws and policies apply. Attach supporting documentation to explain and justify the exemption and whether Contractor selection has been publicly posted.

## COMMONWEALTH TERMS AND CONDITIONS

Identify which Commonwealth Terms and Conditions the Contractor has executed and is

# COMMONWEALTH OF MASSACHUSETTS ~ STANDARD CONTRACT FORM



incorporated by reference into this Contract. This Form is signed only once and recorded on the Vendor Customer File (VCUST). See Vendor File and W-9s Policy.

## COMPENSATION

Identify if the Contract is a Rate Contract (with no stated Maximum Obligation) or a Maximum Obligation Contract (with a stated Maximum Obligation) and identify the Maximum Obligation. If the Contract is being amended, enter the new Maximum Obligation based upon the increase or decreasing Amendment. The Total Maximum Obligation must reflect the total funding for the dates of service under the contract, including the Amendment amount if the Contract is being amended. The Maximum Obligation must match the MMARS encumbrance. Funding and allotments must be verified as available and encumbered prior to incurring obligations. If a Contract includes both a Maximum Obligation component and Rate Contract component, check off both, specific Maximum Obligation amounts or amended amounts and Attachments must clearly outline the Contract breakdown to match the encumbrance.

## PAYMENTS AND PROMPT PAY DISCOUNTS

Payments are processed within a 45 day payment cycle through EFT in accordance with the Commonwealth Bill Paying Policy for investment and cash flow purposes. Departments may NOT negotiate accelerated payments and Payees are NOT entitled to accelerated payments UNLESS a prompt payment discount (PPD) is provided to support the Commonwealth's loss of investment earnings for this earlier payment, or unless a payments is legally mandated to be made in less than 45 days (e.g., construction contracts, Ready Payments under G.L. c. 29, s. 23A). See Prompt Pay Discounts Policy. PPD are identified as a percentage discount which will be automatically deducted when an accelerated payment is made. Reduced contracts rates may not be negotiated to replace a PPD. If PPD fields are left blank please identify that the Contractor agrees to the standard 45 day cycle; a statutory/legal exemption such as Ready Payments (G.L. c. 29, § 23A); or only an initial accelerated payment for reimbursements or start up costs for a grant, with subsequent payments scheduled to support standard EFT 45 day payment cycle. Financial hardship is not a sufficient justification to accelerate cash flow for all payments under a Contract. Initial grant or contract payments may be accelerated for the first invoice or initial grant installment, but subsequent periodic installments or invoice payments should be scheduled to support the Payee cash flow needs and the standard 45 day EFT payment cycle in accordance with the Bill Paying Policy. Any accelerated payment that does not provide for a PPD must have a legal justification in Contract file for audit purposes explaining why accelerated payments were allowable without a PPD.

## BRIEF DESCRIPTION OF CONTRACT PERFORMANCE

Enter a brief description of the Contract performance, project name and/or other identifying information for the Contract to specifically identify the Contract performance, match the Contract with attachments, determine the appropriate expenditure code (as listed in the Expenditure Classification Handbook) or to identify or clarify important information related to the Contract such as the Fiscal Year(s) of performance (ex. "FY2012" or "FY2012-14"). Identify settlements or other exceptions and attach more detailed justification and supporting documents. Enter "Multi-Department Use" if other Departments can access procurement. For Amendments, identify the purpose and what items are being amended. Merely stating "see attached" or referencing attachments without a narrative description of performance is insufficient.

## ANTICIPATED START DATE

The Department and Contractor must certify WHEN obligations under this Contract/Amendment may be incurred. Option 1 is the default option when performance may begin as of the Effective Date (latest signature date and any required approvals). If the parties want a new Contract or renewal to begin as of the upcoming fiscal year then list the fiscal year(s) (ex. "FY2012" or "FY2012-14") in the Brief Description section. Performance starts and encumbrances reflect the default Effective Date (if no FY is listed) or the later FY start date (if a FY is listed). Use Option 2 only when the Contract will be signed well in advance of the start date and identify a specific future start date. Do not use Option 2 for a fiscal year start unless it is certain that the Contract will be signed prior to fiscal year. Option 3 is used in lieu of the Settlement and Release Form when the Contract/Amendment is signed late, and obligations have already been incurred by the Contractor prior to the Effective Date for which the Department has either requested, accepted or deemed legally eligible for reimbursement, and the Contract includes supporting documents justifying the performance or proof of eligibility, and approximate costs. Any obligations incurred outside the scope of the Effective Date under any Option listed, even if the incorrect Option is selected, shall be automatically deemed a settlement included under the terms of the Contract and upon payment to the Contractor will release the Commonwealth from further obligations for the identified performance. All settlement payments require justification and must be under same encumbrance and object codes as the Contract payments. Performance dates are subject to G.L. c.4, § 9.

## CONTRACT END DATE

The Department must enter the date that Contract performance will terminate. If the Contract is being amended and the Contract End Date is not changing, this date must be re-entered again here. A Contract must be signed for at least the initial duration

but not longer than the period of procurement listed in the RFR, or other solicitation document (if applicable). No new performance is allowable beyond the end date without an amendment, but the Department may allow a Contractor to complete minimal close out performance obligations if substantial performance has been made prior to the termination date of the Contract and prior to the end of the fiscal year in which payments are appropriated, provided that any close out performance is subject to appropriation and funding limits under state finance law, and CTR may adjust encumbrances and payments in the state accounting system to enable final close out payments. Performance dates are subject to G.L. c.4, § 9.

## CERTIFICATIONS AND EXECUTION

See Department Head Signature Authorization Policy and the Contractor Authorized Signatory Listing for policies on Contractor and Department signatures.

**Authorizing Signature for Contractor/Date:** The Authorized Contractor Signatory must (in their own handwriting and in ink) sign AND enter the date the Contract is signed. See section above under "Anticipated Contract Start Date". Acceptance of payment by the Contractor shall waive any right of the Contractor to claim the Contract/Amendment is not valid and the Contractor may not void the Contract. Rubber stamps, typed or other images are not acceptable. Proof of Contractor signature authorization on a Contractor Authorized Signatory Listing may be required by the Department if not already on file.

**Contractor Name /Title:** The Contractor Authorized Signatory's name and title must appear legibly as it appears on the Contractor Authorized Signatory Listing.

**Authorizing Signature For Commonwealth/Date:** The Authorized Department Signatory must (in their own handwriting and in ink) sign AND enter the date the Contract is signed. See section above under "Anticipated Start Date". Rubber stamps, typed or other images are not accepted. The Authorized Signatory must be an employee within the Department legally responsible for the Contract. See Department Head Signature Authorization. The Department must have the legislative funding appropriated for all the costs of this Contract or funding allocated under an approved Interdepartmental Service Agreement (ISA). A Department may not contract for performance to be delivered to or by another state department without specific legislative authorization (unless this Contract is a Statewide Contract). For Contracts requiring Secretariat signoff, evidence of Secretariat signoff must be included in the Contract file.

**Department Name /Title:** Enter the Authorized Signatory's name and title legibly.

## CONTRACTOR CERTIFICATIONS AND LEGAL REFERENCES

Notwithstanding verbal or other representations by the parties, the "Effective Date" of this Contract or Amendment shall be the latest date that this Contract or Amendment has been executed by an authorized signatory of the Contractor, the Department, or a later Contract or Amendment Start Date specified, subject to any required approvals. The Contractor makes all certifications required under this Contract under the pains and penalties of perjury, and agrees to provide any required documentation upon request to support compliance, and agrees that all terms governing performance of this Contract and doing business in Massachusetts are attached or incorporated by reference herein:

**Commonwealth and Contractor Ownership Rights.** The Contractor certifies and agrees that the Commonwealth is entitled to ownership and possession of all "deliverables" purchased or developed with Contract funds. A Department may not relinquish Commonwealth rights to deliverables nor may Contractors sell products developed with Commonwealth resources without just compensation. The Contract should detail all Commonwealth deliverables and ownership rights and any Contractor proprietary rights.

**Qualifications.** The Contractor certifies it is qualified and shall at all times remain qualified to perform this Contract; that performance shall be timely and meet or exceed industry standards for the performance required, including obtaining requisite licenses, registrations, permits, resources for performance, and sufficient professional, liability; and other appropriate insurance to cover the performance. If the Contractor is a business, the Contractor certifies that it is listed under the Secretary of State's website as licensed to do business in Massachusetts, as required by law.

**Business Ethics and Fraud, Waste and Abuse Prevention.** The Contractor certifies that performance under this Contract, in addition to meeting the terms of the Contract, will be made using ethical business standards and good stewardship of taxpayer and other public funding and resources to prevent fraud, waste and abuse.

**Collusion.** The Contractor certifies that this Contract has been offered in good faith and without collusion, fraud or unfair trade practices with any other person, that any actions to avoid or frustrate fair and open competition are prohibited by law, and shall be grounds for rejection or disqualification of a Response or termination of this Contract.

**Public Records and Access.** The Contractor shall provide full access to records related to performance and compliance to the Department and officials listed under Executive Order 195 and G.L. c. 11, s.12 seven (7) years beginning on the first day after the final payment under this Contract or such longer period necessary for the resolution of any litigation, claim, negotiation, audit or other inquiry involving this Contract. Access to view Contractor records related to any breach or allegation of fraud, waste and/or abuse may not be denied and Contractor can not claim confidentiality or trade secret protections solely for viewing but not retaining documents. Routine Contract performance compliance reports or documents related to any alleged breach or allegation of non-compliance, fraud, waste, abuse or



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collusion may be provided electronically and shall be provided at Contractor's own expense. Reasonable costs for copies of non-routine Contract related records shall not exceed the rates for public records under 950 C.M.R. 32.00.

**Debarment.** The Contractor certifies that neither it nor any of its subcontractors are currently debarred or suspended by the federal or state government under any law or regulation including, Executive Order 147; G.L. c. 29, s. 29F; G.L. c. 30, § 39R; G.L. c. 149, § 27C; G.L. c. 149, § 44C; G.L. c. 149, § 148B and G.L. c. 152, s. 25C.

**Applicable Laws.** The Contractor shall comply with all applicable state laws and regulations including but not limited to the applicable Massachusetts General Laws; the Official Code of Massachusetts Regulations; Code of Massachusetts Regulations (unofficial); 801 CMR 21.00 (Procurement of Commodity and Service Procurements, including Human and Social Services); 815 CMR 2.00 (Grants and Subsidies); 808 CMR 1.00 (Compliance, Reporting and Auditing for Human And Social Services); AICPA Standards; confidentiality of Department records under G.L. c. 66A; and the Massachusetts Constitution Article XVIII if applicable.

**Invoices.** The Contractor must submit invoices in accordance with the terms of the Contract and the Commonwealth Bill Paying Policy. Contractors must be able to reconcile and properly attribute concurrent payments from multiple Departments. Final invoices in any fiscal year must be submitted no later than August 15<sup>th</sup> for performance made and received (goods delivered, services completed) prior to June 30<sup>th</sup>, in order to make payment for that performance prior to the close of the fiscal year to prevent reversion of appropriated funds. Failure to submit timely invoices by August 15<sup>th</sup> or other date listed in the Contract shall authorize the Department to issue an estimated payment based upon the Department's determination of performance delivered and accepted. The Contractor's acceptance of this estimated payment releases the Commonwealth from further claims for these invoices. If budgetary funds revert due to the Contractor's failure to submit timely final invoices, or for disputing an estimated payment, the Department may deduct a penalty up to 10% from any final payment in the next fiscal year for failure to submit timely invoices.

**Payments Subject To Appropriation.** Pursuant to G.L. c. 29 § 26, § 27 and § 29, Departments are required to expend funds only for the purposes set forth by the Legislature and within the funding limits established through appropriation, allotment and subsidiary, including mandated allotment reductions triggered by G.L. c. 29, § 9C. A Department cannot authorize or accept performance in excess of an existing appropriation and allotment, or sufficient non-appropriated available funds. Any oral or written representations, commitments, or assurances made by the Department or any other Commonwealth representative are not binding. The Commonwealth has no legal obligation to compensate a Contractor for performance that is not requested and is intentionally delivered by a Contractor outside the scope of a Contract. Contractors should verify funding prior to beginning performance.

**Intercept.** Contractors may be registered as Customers in the Vendor file if the Contractor owes a Commonwealth debt. Unresolved and undisputed debts, and overpayments of Contract payments that are not reimbursed timely shall be subject to intercept pursuant to G.L. c. 7A, s. 3 and 815 CMR 9.00. Contract overpayments will be subject to immediate intercept or payment offset. The Contractor may not penalize any state Department or assess late fees, cancel a Contract or other services if amounts are intercepted or offset due to recoupment of an overpayment, outstanding taxes, child support, other overdue debts or Contract overpayments.

**Tax Law Compliance.** The Contractor certifies under the pains and penalties of perjury tax compliance with Federal tax laws; state tax laws including but not limited to G.L. c. 62C; G.L. c. 62C, s. 49A; compliance with all state tax laws, reporting of employees and contractors, withholding and remitting of tax withholdings and child support and is in good standing with respect to all state taxes and returns due; reporting of employees and contractors under G.L. c. 62E; withholding and remitting child support including G.L. c. 119A, s. 12; TIR 05-11; New Independent Contractor Provisions and applicable TIRs.

**Bankruptcy, Judgments, Potential Structural Changes, Pending Legal Matters and Conflicts.** The Contractor certifies it has not been in bankruptcy and/or receivership within the last three calendar years, and the Contractor certifies that it will immediately notify the Department in writing at least 45 days prior to filing for bankruptcy and/or receivership, any potential structural change in its organization, or if there is any risk to the solvency of the Contractor that may impact the Contractor's ability to timely fulfill the terms of this Contract or Amendment. The Contractor certifies that at any time during the period of the Contract the Contractor is required to affirmatively disclose in writing to the Department Contract Manager the details of any judgment, criminal conviction, investigation or litigation pending against the Contractor or any of its officers, directors, employees, agents, or subcontractors, including any potential conflicts of interest of which the Contractor has knowledge, or learns of during the Contract term. Law firms or Attorneys providing legal services are required to identify any potential conflict with representation of any Department client in accordance with Massachusetts Board of Bar Overseers (BBO) rules.

**Federal Anti-Lobbying and Other Federal Requirements.** If receiving federal funds, the Contractor certifies compliance with federal anti-lobbying requirements including 31 USC 1352; other federal requirements; Executive Order 11246; Air Pollution Act; Federal Water Pollution Control Act and Federal Employment Laws.

**Protection of Personal Data and Information.** The Contractor certifies that all steps will be taken to ensure the security and confidentiality of all Commonwealth data for which the Contractor becomes a holder, either as part of performance or inadvertently during performance, with special attention to restricting access, use and disbursement of personal data and information under G.L. c. 93H and c. 66A and Executive Order 504. The Contractor is required to comply with G.L. c. 93I for the proper disposal of all paper and electronic media, backups or systems containing personal data and information, provided further that the Contractor is required to ensure that any personal data or information transmitted electronically or through a portable device be properly encrypted using (at a minimum) Information Technology Division (ITD) Protection of Sensitive Information, provided further that any Contractor having access to credit card or banking information of Commonwealth customers certifies that the Contractor is PCI compliant in accordance with the Payment Card Industry Council Standards and shall provide confirmation compliance during the Contract, provide further that the Contractor shall immediately notify the Department in the event of any security breach including the unauthorized access, disbursement, use or disposal of personal data or information, and in the event of a security breach, the Contractor shall cooperate fully with the Commonwealth and provide access to any information necessary for the Commonwealth to respond to the security breach and shall be fully responsible for any damages associated with the Contractor's breach including but not limited to G.L. c. 214, s. 3B.

**Corporate and Business Filings and Reports.** The Contractor certifies compliance with any certification, filing, reporting and service of process requirements of the Secretary of the Commonwealth, the Office of the Attorney General or other Departments as related to its conduct of business in the Commonwealth; and with its incorporating state (or foreign entity).

**Employer Requirements.** Contractors that are employers certify compliance with applicable state and federal employment laws or regulations, including but not limited to G.L. c. 5, s. 1 (Prevailing Wages for Printing and Distribution of Public Documents); G.L. c. 7, s. 22 (Prevailing Wages for Contracts for Meal Products and Clothing and Apparel); minimum wages and prevailing wage programs and payments; unemployment insurance and contributions; workers' compensation and insurance; child labor laws; AGO fair labor practices; G.L. c. 149 (Labor and Industries); G.L. c. 150A (Labor Relations); G.L. c. 151 and 455 CMR 2.00 (Minimum Fair Wages); G.L. c. 151A (Employment and Training); G.L. c. 151B (Unlawful Discrimination); G.L. c. 151E (Business Discrimination); G.L. c. 152 (Workers' Compensation); G.L. c. 153 (Liability for Injuries); 29 USC c. 8 (Federal Fair Labor Standards); 29 USC c. 28 and the Federal Family and Medical Leave Act.

**Federal And State Laws And Regulations Prohibiting Discrimination** including but not limited to the Federal Equal Employment Opportunity (EEO) Laws the Americans with Disabilities Act; 42 U.S.C. Sec. 12101, et seq.; the Rehabilitation Act; 29 USC c. 16 s. 794; 29 USC c. 16 s. 701; 29 USC c. 14, 623; the 42 USC c. 45; (Federal Fair Housing Act); G.L. c. 151B (Unlawful Discrimination); G.L. c. 151E (Business Discrimination); the Public Accommodations Law G.L. c. 272, s. 92A; G.L. c. 272, s. 98 and 98A, Massachusetts Constitution Article CXIV and G.L. c. 93, s. 103; 47 USC c. 5, sc. II, Part II, s. 255 (Telecommunication Act); Chapter 149, Section 105D; G.L. c. 151C; G.L. c. 272, Section 92A, Section 98 and Section 98A, and G.L. c. 111, Section 199A, and Massachusetts Disability-Based Non-Discrimination Standards For Executive Branch Entities, and related Standards and Guidance, authorized under Massachusetts Executive Order or any disability-based protection arising from state or federal law or precedent. See also MCAD and MCAD links and Resources.

**Small Business Purchasing Program (SBPP).** A Contractor may be eligible to participate in the SBPP, created pursuant to Executive Order 523, if qualified through the SBPP COMMBUYS subscription process at: www.commbuys.com and with acceptance of the terms of the SBPP participation agreement.

**Limitation of Liability for Information Technology Contracts (and other Contracts as Authorized).** The Information Technology Mandatory Specifications and the IT Acquisition Accessibility Contract Language are incorporated by reference into Information Technology Contracts. The following language will apply to Information Technology contracts in the U01, U02, U03, U04, U05, U06, U07, U08, U09, U10, U75, U98 object codes in the Expenditure Classification Handbook or other Contracts as approved by CTR or OSD. Pursuant to Section 11. Indemnification of the Commonwealth Terms and Conditions, the term "other damages" shall include, but shall not be limited to, the reasonable costs the Commonwealth incurs to repair, return, replace or seek cover (purchase of comparable substitute commodities and services) under a Contract. "Other damages" shall not include damages to the Commonwealth as a result of third party claims, provided, however, that the foregoing in no way limits the Commonwealth's right of recovery for personal injury or property damages or patent and copyright infringement under Section 11 nor the Commonwealth's ability to join the contractor as a third party defendant. Further, the term "other damages" shall not include, and in no event shall the contractor be liable for, damages for the Commonwealth's use of contractor provided products or services, loss of Commonwealth records, or data (or other intangible property), loss of use of equipment, lost revenue, lost savings or lost profits of the Commonwealth. In no event shall "other damages" exceed the greater of \$100,000, or two times the value of the product or service (as defined in the Contract scope of work) that is the subject of the claim. Section 11 sets forth the contractor's entire liability under a Contract. Nothing in this section shall limit the

# COMMONWEALTH OF MASSACHUSETTS ~ STANDARD CONTRACT FORM



Commonwealth's ability to negotiate higher limitations of liability in a particular Contract, provided that any such limitation must specifically reference Section 11 of the Commonwealth Terms and Conditions. In the event the limitation of liability conflicts with accounting standards which mandate that there can be no cap of damages, the limitation shall be considered waived for that audit engagement. These terms may be applied to other Contracts only with prior written confirmation from the Operational Services Division or the Office of the Comptroller. The terms in this Clarification may not be modified.

**Northern Ireland Certification.** Pursuant to G.L. c. 7 § 22C for state agencies, state authorities, the House of Representatives or the state Senate, by signing this Contract the Contractor certifies that it does not employ ten or more employees in an office or other facility in Northern Ireland and if the Contractor employs ten or more employees in an office or other facility located in Northern Ireland the Contractor certifies that it does not discriminate in employment, compensation, or the terms, conditions and privileges of employment on account of religious or political belief; and it promotes religious tolerance within the work place, and the eradication of any manifestations of religious and other illegal discrimination; and the Contractor is not engaged in the manufacture, distribution or sale of firearms, munitions, including rubber or plastic bullets, tear gas, armored vehicles or military aircraft for use or deployment in any activity in Northern Ireland.

**Pandemic, Disaster or Emergency Performance.** In the event of a serious emergency, pandemic or disaster outside the control of the Department, the Department may negotiate emergency performance from the Contractor to address the immediate needs of the Commonwealth even if not contemplated under the original Contract or procurement. Payments are subject to appropriation and other payment terms.

**Consultant Contractor Certifications (For Consultant Contracts "HH" and "NN" and "U05" object codes subject to G.L. Chapter 29, s. 29A).** Contractors must make required disclosures as part of the RFR Response or using the Consultant Contractor Mandatory Submission Form.

**Attorneys.** Attorneys or firms providing legal services or representing Commonwealth Departments may be subject to G.L. c. 30, s. 65, and if providing litigation services must be approved by the Office of the Attorney General to appear on behalf of a Department, and shall have a continuing obligation to notify the Commonwealth of any conflicts of interest arising under the Contract.

**Subcontractor Performance.** The Contractor certifies full responsibility for Contract performance, including subcontractors, and that comparable Contract terms will be included in subcontracts, and that the Department will not be required to directly or indirectly manage subcontractors or have any payment obligations to subcontractors.

## EXECUTIVE ORDERS

For covered Executive state Departments, the Contractor certifies compliance with applicable Executive Orders (see also Massachusetts Executive Orders), including but not limited to the specific orders listed below. A breach during period of a Contract may be considered a material breach and subject Contractor to appropriate monetary or Contract sanctions.

**Executive Order 481. Prohibiting the Use of Undocumented Workers on State Contracts.** For all state agencies in the Executive Branch, including all executive offices, boards, commissions, agencies, Departments, divisions, councils, bureaus, and offices, now existing and hereafter established, by signing this Contract the Contractor certifies under the pains and penalties of perjury that they shall not knowingly use undocumented workers in connection with the performance of this Contract; that, pursuant to federal requirements, shall verify the immigration status of workers assigned to a Contract without engaging in unlawful discrimination; and shall not knowingly or recklessly alter, falsify, or accept altered or falsified documents from any such worker

**Executive Order 130. Anti-Boycott.** The Contractor warrants, represents and agrees that during the time this Contract is in effect, neither it nor any affiliated company, as hereafter defined, participates in or cooperates with an international boycott (See IRC § 999(b)(3)-(4), and IRS Audit Guidelines Boycotts) or engages in conduct declared to be unlawful by G.L. c. 151E, s. 2. A breach in the warranty, representation, and agreement contained in this paragraph, without limiting such other rights as it may have, the Commonwealth shall be entitled to rescind this Contract. As used herein, an affiliated company shall be any business entity of which at least 51% of the ownership interests are directly or indirectly owned by the Contractor or by a person or persons or business entity or entities directly or indirectly owning at least 51% of the ownership interests of the Contractor, or which directly or indirectly owns at least 51% of the ownership interests of the Contractor.

**Executive Order 346. Hiring of State Employees By State Contractors** Contractor certifies compliance with both the conflict of interest law G.L. c. 268A specifically s. 5 (f) and this order; and includes limitations regarding the hiring of state employees by private companies contracting with the Commonwealth. A privatization contract shall be deemed to include a specific prohibition against the hiring at any time during the term of Contract, and for any position in the Contractor's company, any state management employee who is, was, or will be involved in the preparation of the RFP, the negotiations leading to the awarding of the Contract, the decision to award the Contract, and/or the supervision or oversight of performance under the Contract.

**Executive Order 444. Disclosure of Family Relationships With Other State Employees.** Each person applying for employment (including Contract work) within the Executive Branch under the Governor must disclose in writing the names of all immediate family

related to immediate family by marriage who serve as employees or elected officials of the Commonwealth. All disclosures made by applicants hired by the Executive Branch under the Governor shall be made available for public inspection to the extent permissible by law by the official with whom such disclosure has been filed.

**Executive Order 504. Regarding the Security and Confidentiality of Personal Information.** For all Contracts involving the Contractor's access to personal information, as defined in G.L. c. 93H, and personal data, as defined in G.L. c. 66A, owned or controlled by Executive Department agencies, or access to agency systems containing such information or data (herein collectively "personal information"), Contractor certifies under the pains and penalties of perjury that the Contractor (1) has read Commonwealth of Massachusetts Executive Order 504 and agrees to protect any and all personal information; and (2) has reviewed all of the Commonwealth Information Technology Division's Security Policies. Notwithstanding any contractual provision to the contrary, in connection with the Contractor's performance under this Contract, for all state agencies in the Executive Department, including all executive offices, boards, commissions, agencies, departments, divisions, councils, bureaus, and offices, now existing and hereafter established, the Contractor shall: (1) obtain a copy, review, and comply with the contracting agency's Information Security Program (ISP) and any pertinent security guidelines, standards, and policies; (2) comply with all of the Commonwealth of Massachusetts Information Technology Division's "Security Policies" (3) communicate and enforce the contracting agency's ISP and such Security Policies against all employees (whether such employees are direct or contracted) and subcontractors; (4) implement and maintain any other reasonable appropriate security procedures and practices necessary to protect personal information to which the Contractor is given access by the contracting agency from the unauthorized access, destruction, use, modification, disclosure or loss; (5) be responsible for the full or partial breach of any of these terms by its employees (whether such employees are direct or contracted) or subcontractors during or after the term of this Contract, and any breach of these terms may be regarded as a material breach of this Contract; (6) in the event of any unauthorized access, destruction, use, modification, disclosure or loss of the personal information (collectively referred to as the "unauthorized use"): (a) immediately notify the contracting agency if the Contractor becomes aware of the unauthorized use; (b) provide full cooperation and access to information necessary for the contracting agency to determine the scope of the unauthorized use; and (c) provide full cooperation and access to information necessary for the contracting agency and the Contractor to fulfill any notification requirements. Breach of these terms may be regarded as a material breach of this Contract, such that the Commonwealth may exercise any and all contractual rights and remedies, including without limitation indemnification under Section 11 of the Commonwealth's Terms and Conditions, withholding of payments, Contract suspension, or termination. In addition, the Contractor may be subject to applicable statutory or regulatory penalties, including and without limitation, those imposed pursuant to G.L. c. 93H and under G.L. c. 214, § 3B for violations under M.G.L. c. 66A.

**Executive Orders 523, 524 and 526.** Executive Order 526 (Order Regarding Non-Discrimination, Diversity, Equal Opportunity and Affirmative Action which supersedes Executive Order 478) Executive Order 524 (Establishing the Massachusetts Supplier Diversity Program which supersedes Executive Order 390). Executive Order 523 (Establishing the Massachusetts Small Business Purchasing Program.) All programs, activities, and services provided, performed, licensed, chartered, funded, regulated, or contracted for by the state shall be conducted without unlawful discrimination based on race, color, age, gender, ethnicity, sexual orientation, gender identity or expression, religion, creed, ancestry, national origin, disability, veteran's status (including Vietnam-era veterans), or background. The Contractor and any subcontractors may not engage in discriminatory employment practices; and the Contractor certifies compliance with applicable federal and state laws, rules, and regulations governing fair labor and employment practices; and the Contractor commits to purchase supplies and services from certified minority or women-owned businesses, small businesses, or businesses owned by socially or economically disadvantaged persons or persons with disabilities. These provisions shall be enforced through the contracting agency, OSD, and/or the Massachusetts Commission Against Discrimination. Any breach shall be regarded as a material breach of the contract that may subject the contractor to appropriate sanctions.



**Form W-9**  
(Massachusetts Substitute W-9 Form)  
Rev. April 2009

# Request for Taxpayer Identification Number and Certification

Completed form should be given to the requesting department or the department you are currently doing business with.

Name (List legal name, if joint names, list first & circle the name of the person whose TIN you enter in Part I. See Specific Instruction on page 2.)

Town of Halifax, Massachusetts

Business name, if different from above. (See Specific Instruction on page 2.)

Check the appropriate box: ☐ Individual/Sole proprietor ☒ Corporation ☐ Partnership ☐ Other

Legal Address: Number, street, and apt. or suite no.  
499 Plymouth Street

Remittance Address: If different from legal address number, street, and apt. or suite no.

City, state and ZIP code  
Halifax, MA 02338

City, state and ZIP code

Phone #: (781) 294-1316 Fax #: (781) 294-7684 Email address: cseelig@town.halifax.ma.us

## Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instruction on page 2. For other entities, it is your employer identification number (EIN). If you do not have a number, see How to get a TIN on page 2.

Note: If the account is in more than one name, see the chart on page 2 for guidelines on whose number to enter.

Social security number

OR

Employer identification number

04-6001167

DUNS

075370296

## Part II Certification

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
- I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Services (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
- I am an U.S. person (including an U.S. resident alien).
- I am currently a Commonwealth of Massachusetts state employee: (check one) ☐ No ☐ Yes. If yes, in compliance with the State Ethics Commission requirements.

Certification Instructions: You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply.

Sign

Here

Authorized Signature

Date

## Purpose of Form

A person who is required to file an information return with the IRS must get your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to give your correct TIN to the person requesting it (the requester) and, when applicable, to:

- Certify the TIN you are giving is correct (or you are waiting for a number to be issued).
- Certify you are not subject to backup withholding.

If you are a foreign person, use the appropriate Form W-8. See Pub 515, Withholding of Tax on Nonresident Aliens and Foreign Corporations.

What is backup withholding? Persons making certain payments to you must withhold a designated percentage, currently 28% and pay to the IRS of such payments under certain

conditions. This is called "backup withholding." Payments that may be subject to backup withholding include interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

If you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return, payments you receive will not be subject to backup withholding. Payments you receive will be subject to backup withholding if:

- You do not furnish your TIN to the requester, or
- You do not certify your TIN when required (see the Part II instructions on page 2 for details), or
- The IRS tells the requester that you furnished an incorrect TIN, or
- The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends only, or

5. You do not certify to the requester that you are not subject to backup withholding under 4 (above) (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See the Part II instructions on page 2.

## Penalties

**Failure to furnish TIN.** If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

**Civil penalty for false information with respect to withholding.** If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

**Criminal penalty for falsifying information.** Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

**Misuse of TINs.** If the requester discloses or uses TINs in violation of Federal law, the requester may be subject to civil and criminal penalties.

## Specific Instructions

**Name.** If you are an individual, you must generally enter the name shown on your social security card. However, if you have changed your last name, for instance (due to marriage) without informing the Social Security Administration of the name change, enter your first name, the last name shown on your social security card, and your new last name.

If the account is in joint names, list first and then circle the name of the person or entity whose number you enter in Part II of the form.

**Sole proprietor.** Enter your individual name as shown on your social security card on the "Name" line. You may enter your business, trade, or doing business as (DBA) name on the "Business name" line.

**Limited liability company (LLC).** If you are a single-member LLC (including a foreign LLC with a domestic owner) that is disregarded as an entity separate from its owner under Treasury regulations section 301.7701-3, enter the owner's name on the "Name" line. Enter the LLC's name on the "Business name" line.

**Caution:** A disregarded domestic entity that has a foreign owner must use the appropriate Form W-8.

**Other entities.** Enter your business name as shown on required federal tax documents on the "Name" line. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on the "Business name" line.

## Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box.

If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see How to get a TIN below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are an LLC that is disregarded as an entity separate from its owner (see *Limited liability company (LLC)* above), and are owned by an individual, enter your SSN (or "pre-LLC" EIN, if desired). If the owner of a disregarded LLC is a corporation, partnership, etc., enter the owner's EIN.

**Note:** See the chart on this page for further clarification of name and TIN combinations.

**How to get a TIN.** If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local Social Security Administration office. Get Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can get Forms W-7 and SS-4 from the IRS by calling 1-800-TAX-FORM (1-800-829-3676) or from the IRS's Internet Web Site [www.irs.gov](http://www.irs.gov).

If you do not have a TIN, write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments.

The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

**Note:** Writing "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

## Part II Certification

To establish to the paying agent that your TIN is correct or you are a U.S. person, or resident alien, sign Form W-9.

For a joint account, only the person whose TIN is shown in Part II should sign (when required).

Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

**Dunn and Bradstreet Universal Numbering System (DUNS) number requirement.** The United States Office of Management and Budget (OMB) requires all vendors that receive federal grant funds have their DUNS number recorded with and subsequently reported to the granting agency. If a contractor has multiple DUNS numbers, the contractor should provide the primary number listed with the Federal government's Central Contractor Registration (CCR) at [www.ccr.gov](http://www.ccr.gov). Any entity that does not have a DUNS number can apply for one online at <http://www.dnb.com/us/> under the DNB D-U-N-I Number Tab.

## Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to give your correct TIN to persons who must file information returns with the IRS to report interest, dividends, and certain other income paid to you, mortgage interest you paid, the acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA or IRA. The IRS uses the numbers for identification purposes and to help verify the accuracy of your tax return. The IRS may also provide this information to the Department of Justice for civil and criminal litigation, and to cities, states, and the District of Columbia to carry out their tax laws.

You must provide your TIN whether or not you are required to file a tax return. Payers must generally withhold a designated percentage, currently 28% of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to a payer. Certain penalties may also apply.

## What Name and Number to Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account)	The actual owner of the account or, if combined funds, the first individual on the account. <sup>1</sup>
3. Custodian account of a minor (Uniform Gift to Minors Act)	The minor. <sup>2</sup>
4. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee. <sup>1</sup>
b. So-called trust account that is not a legal or valid trust under state law	The actual owner. <sup>1</sup>
5. Sole proprietorship	The owner. <sup>3</sup>
For this type of account:	Give name and EIN of:
6. Sole proprietorship	The owner.
7. A valid trust, estate, or pension trust	Legal entity. <sup>4</sup>
8. Corporate	The corporation.
9. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization.
10. Partnership	The partnership.
11. A broker or registered nominee	The broker or nominee.
12. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity.

<sup>1</sup> List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

<sup>2</sup> Circle the minor's name and furnish the minor's SSN.

<sup>3</sup> You must show your individual name, but you may also enter your business or DBA name. You may use either your SSN or EIN (if you have one).

<sup>4</sup> List first and circle the name of the legal trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.)

**Note:** If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

If you have questions on completing this form, please contact the Office of the State Comptroller. (617) 973-2468.

Upon completion of this form, please send it to the Commonwealth of Massachusetts Department you are doing business with.

**COMMONWEALTH OF MASSACHUSETTS  
CONTRACTOR AUTHORIZED SIGNATORY LISTING**

Issued May

2004



**CONTRACTOR LEGAL NAME :**

**CONTRACTOR VENDOR/CUSTOMER CODE:**

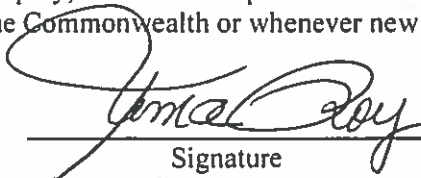
**INSTRUCTIONS:** Any Contractor (other than a sole-proprietor or an individual contractor) must provide a listing of individuals who are authorized as legal representatives of the Contractor who can sign contracts and other legally binding documents related to the contract on the Contractor's behalf. In addition to this listing, any state department may require additional proof of authority to sign contracts on behalf of the Contractor, or proof of authenticity of signature (a notarized signature that the Department can use to verify that the signature and date that appear on the Contract or other legal document was actually made by the Contractor's authorized signatory, and not by a representative, designee or other individual.)

**NOTICE:** *Acceptance of any payment under a Contract or Grant shall operate as a waiver of any defense by the Contractor challenging the existence of a valid Contract due to an alleged lack of actual authority to execute the document by the signatory.*

For privacy purposes **DO NOT ATTACH** any documentation containing personal information, such as bank account numbers, social security numbers, driver's licenses, home addresses, social security cards or any other personally identifiable information that you do not want released as part of a public record. The Commonwealth reserves the right to publish the names and titles of authorized signatories of contractors.

AUTHORIZED SIGNATORY NAME	TITLE
Kim Roy	Chairman
Troy E. Garron	Vice-Chairman
Thomas Millias	Clerk

I certify that I am the President, Chief Executive Officer, Chief Fiscal Officer, Corporate Clerk or Legal Counsel for the Contractor and as an authorized officer of the Contractor I certify that the names of the individuals identified on this listing are current as of the date of execution below and that these individuals are authorized to sign contracts and other legally binding documents related to contracts with the Commonwealth of Massachusetts on behalf of the Contractor. I understand and agree that the Contractor has a duty to ensure that this listing is immediately updated and communicated to any state department with which the Contractor does business whenever the authorized signatories above retire, are otherwise terminated from the Contractor's employ, have their responsibilities changed resulting in their no longer being authorized to sign contracts with the Commonwealth or whenever new signatories are designated.

  
Signature

Date: May 15<sup>th</sup> 2016

Title: Chairman, Board of Selemen

Telephone: 781-294-1316

Fax: 781-294-7684

Email: cseelig@town.halifax.ma.us (Town Administrator)

[Listing can not be accepted without all of this information completed.]

A copy of this listing must be attached to the "record copy" of a contract filed with the department.



COMMONWEALTH OF MASSACHUSETTS  
CONTRACTOR AUTHORIZED SIGNATORY LISTING

Issued May  
2004



CONTRACTOR LEGAL NAME :  
CONTRACTOR VENDOR/CUSTOMER CODE:

PROOF OF AUTHENTICATION OF SIGNATURE

This page is optional and is available for a department to authenticate contract signatures.  
It is recommended that Departments obtain authentication of signature for the signatory  
who submits the Contractor Authorized Listing.

This Section MUST be completed by the Contractor Authorized Signatory in presence of notary.

Signatory's full legal name (print or type): Kim Roy

Title: Chairman, Board of Selectmen

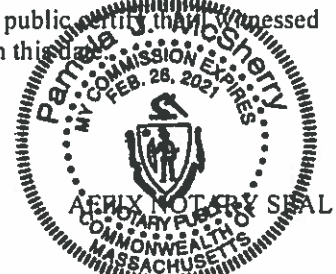
X

Signature as it will appear on contract or other document (Complete only in presence of notary):

AUTHENTICATED BY NOTARY OR CORPORATE CLERK (PICK ONLY ONE) AS FOLLOWS:

I, Pamela M. Sherry (NOTARY) as a notary public certify that I witnessed  
the signature of the aforementioned signatory above and I verified the individual's identity on this date:

May 16, 2016  
My commission expires on: 2/26/21



I, \_\_\_\_\_ (CORPORATE CLERK) certify that I witnessed the  
signature of the aforementioned signatory above, that I verified the individual's identity and confirm the individual's  
authority as an authorized signatory for the Contractor on this date:

\_\_\_\_\_, 20 \_\_\_\_.

AFFIX CORPORATE SEAL





## COMMONWEALTH TERMS AND CONDITIONS

This Commonwealth Terms and Conditions form is jointly issued by the Executive Office for Administration and Finance (ANF), the Office of the Comptroller (CTR) and the Operational Services Division (OSD) for use by all Commonwealth of Massachusetts ("State") Departments and Contractors. *Any changes or electronic alterations by either the Department or the Contractor to the official version of this form, as jointly published by ANF, CTR and OSD, shall be void.* Upon execution of these Commonwealth Terms and Conditions by the Contractor and filing as prescribed by the Office of the Comptroller, these Commonwealth Terms and Conditions will be incorporated by reference into any Contract for Commodities and Services executed by the Contractor and any State Department, in the absence of a superseding law or regulation requiring a different Contract form. Performance shall include services rendered, obligations due, costs incurred, commodities and deliverables provided and accepted by the Department, programs provided or other commitments authorized under a Contract. A deliverable shall include any tangible product to be delivered as an element of performance under a Contract. The Commonwealth is entitled to ownership and possession of all deliverables purchased or developed with State funds. Contract shall mean the Standard Contract Form issued jointly by ANF, CTR and OSD.

1. **Contract Effective Start Date.** Notwithstanding verbal or other representations by the parties, or an earlier start date indicated in a Contract, the effective start date of performance under a Contract shall be the date a Contract has been executed by an authorized signatory of the Contractor, the Department, a later date specified in the Contract or the date of any approvals required by law or regulation, whichever is later.

2. **Payments And Compensation.** The Contractor shall only be compensated for performance delivered and accepted by the Department in accordance with the specific terms and conditions of a Contract. All Contract payments are subject to appropriation pursuant to M.G.L. C. 29, §26, or the availability of sufficient non-appropriated funds for the purposes of a Contract, and shall be subject to intercept pursuant to M.G.L. C. 7A, §3 and 815 CMR 9.00. Overpayments shall be reimbursed by the Contractor or may be offset by the Department from future payments in accordance with state finance law. Acceptance by the Contractor of any payment or partial payment, without any written objection by the Contractor, shall in each instance operate as a release and discharge of the State from all claims, liabilities or other obligations relating to the performance of a Contract.

3. **Contractor Payment Mechanism.** All Contractors will be paid using the Payment Voucher System unless a different payment mechanism is required. The Contractor shall timely submit invoices (Payment Vouchers - Form PV) and supporting documentation as prescribed in a Contract. The Department shall review and return rejected invoices within fifteen (15) days of receipt with a written explanation for rejection. Payments shall be made in accordance with the bill paying policy issued by the Office of the Comptroller and 815 CMR 4.00, provided that payment periods listed in a Contract of less than forty-five (45)

days from the date of receipt of an invoice shall be effective only to enable a Department to take advantage of early payment incentives and shall not subject any payment made within the forty-five (45) day period to a penalty. The Contractor Payroll System, shall be used only for "Individual Contractors" who have been determined to be "Contract Employees" as a result of the Department's completion of an Internal Revenue Service SS-8 form in accordance with the Omnibus Budget Reconciliation Act (OBRA) 1990, and shall automatically process all state and federal mandated payroll, tax and retirement deductions.

4. **Contract Termination Or Suspension.** A Contract shall terminate on the date specified in a Contract, unless this date is properly amended in accordance with all applicable laws and regulations prior to this date, or unless terminated or suspended under this Section upon prior written notice to the Contractor. The Department may terminate a Contract without cause and without penalty, or may terminate or suspend a Contract if the Contractor breaches any material term or condition or fails to perform or fulfill any material obligation required by a Contract, or in the event of an elimination of an appropriation or availability of sufficient funds for the purposes of a Contract, or in the event of an unforeseen public emergency mandating immediate Department action. Upon immediate notification to the other party, neither the Department nor the Contractor shall be deemed to be in breach for failure or delay in performance due to Acts of God or other causes factually beyond their control and without their fault or negligence. Subcontractor failure to perform or price increases due to market fluctuations or product availability will not be deemed factually beyond the Contractor's control.

5. **Written Notice.** Any notice shall be deemed delivered and received when submitted in writing in person or when delivered by any other appropriate method evidencing actual receipt by the Department or the Contractor. Any written notice of termination or suspension delivered to the Contractor shall state the effective date and period of the notice, the reasons for the termination or suspension, if applicable, any alleged breach or failure to perform, a reasonable period to cure any alleged breach or failure to perform, if applicable, and any instructions or restrictions concerning allowable activities, costs or expenditures by the Contractor during the notice period.

6. **Confidentiality.** The Contractor shall comply with M.G.L. C. 66A if the Contractor becomes a "holder" of "personal data". The Contractor shall also protect the physical security and restrict any access to personal or other Department data in the Contractor's possession, or used by the Contractor in the performance of a Contract, which shall include, but is not limited to the Department's public records, documents, files, software, equipment or systems.

7. **Record-keeping And Retention, Inspection Of Records.** The Contractor shall maintain records, books, files and other data as specified in a Contract and in such detail as shall properly substantiate claims for payment under a Contract, for a minimum retention period of seven (7) years beginning on the first day after the final payment under a Contract, or such longer period as



## COMMONWEALTH TERMS AND CONDITIONS

is necessary for the resolution of any litigation, claim, negotiation, audit or other inquiry involving a Contract. The Department shall have access, as well as any parties identified under Executive Order 195, during the Contractor's regular business hours and upon reasonable prior notice, to such records, including on-site reviews and reproduction of such records at a reasonable expense.

8. **Assignment.** The Contractor may not assign or delegate, in whole or in part, or otherwise transfer any liability, responsibility, obligation, duty or interest under a Contract, with the exception that the Contractor shall be authorized to assign present and prospective claims for money due to the Contractor pursuant to a Contract in accordance with M.G.L. C. 106, §9-318. The Contractor must provide sufficient notice of assignment and supporting documentation to enable the Department to verify and implement the assignment. Payments to third party assignees will be processed as if such payments were being made directly to the Contractor and these payments will be subject to intercept, offset, counter claims or any other Department rights which are available to the Department or the State against the Contractor.

9. **Subcontracting By Contractor.** Any subcontract entered into by the Contractor for the purposes of fulfilling the obligations under a Contract must be in writing, authorized in advance by the Department and shall be consistent with and subject to the provisions of these Commonwealth Terms and Conditions and a Contract. Subcontracts will not relieve or discharge the Contractor from any duty, obligation, responsibility or liability arising under a Contract. The Department is entitled to copies of all subcontracts and shall not be bound by any provisions contained in a subcontract to which it is not a party.

10. **Affirmative Action, Non-Discrimination In Hiring And Employment.** The Contractor shall comply with all federal and state laws, rules and regulations promoting fair employment practices or prohibiting employment discrimination and unfair labor practices and shall not discriminate in the hiring of any applicant for employment nor shall any qualified employee be demoted, discharged or otherwise subject to discrimination in the tenure, position, promotional opportunities, wages, benefits or terms and conditions of their employment because of race, color, national origin, ancestry, age, sex, religion, disability, handicap, sexual orientation or for exercising any rights afforded by law. The Contractor commits to purchasing supplies and services from certified minority or women-owned businesses, small businesses or businesses owned by socially or economically disadvantaged persons or persons with disabilities.

11. **Indemnification.** Unless otherwise exempted by law, the Contractor shall indemnify and hold harmless the State, including the Department, its agents, officers and employees against any and all claims, liabilities and costs for any personal injury or property damages, patent or copyright infringement or other damages that the State may sustain which arise out of or in connection with the Contractor's performance of a Contract, including but not limited to the negligence, reckless or intentional conduct of the Contractor, its agents, officers,

employees or subcontractors. The Contractor shall at no time be considered an agent or representative of the Department or the State. After prompt notification of a claim by the State, the Contractor shall have an opportunity to participate in the defense of such claim and any negotiated settlement agreement or judgment. The State shall not be liable for any costs incurred by the Contractor arising under this paragraph. Any indemnification of the Contractor shall be subject to appropriation and applicable law.

12. **Waivers.** Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any way limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach.

13. **Risk Of Loss.** The Contractor shall bear the risk of loss for any Contractor materials used for a Contract and for all deliverables, Department personal or other data which is in the possession of the Contractor or used by the Contractor in the performance of a Contract until possession, ownership and full legal title to the deliverables are transferred to and accepted by the Department.

14. **Forum, Choice of Law And Mediation.** Any actions arising out of a Contract shall be governed by the laws of Massachusetts, and shall be brought and maintained in a State or federal court in Massachusetts which shall have exclusive jurisdiction thereof. The Department, with the approval of the Attorney General's Office, and the Contractor may agree to voluntary mediation through the Massachusetts Office of Dispute Resolution (MODR) of any Contract dispute and will share the costs of such mediation. No legal or equitable rights of the parties shall be limited by this Section.

15. **Contract Boilerplate Interpretation, Severability, Conflicts With Law, Interruption.** Any amendment or attachment to any Contract which contains conflicting language or has the affect of a deleting, replacing or modifying any printed language of these Commonwealth Terms and Conditions, as officially published by ANF, CTR and OSD, shall be interpreted as superseded by the official printed language. If any provision of a Contract is found to be superseded by state or federal law or regulation, in whole or in part, then both parties shall be relieved of all obligations under that provision only to the extent necessary to comply with the superseding law, provided however, that the remaining provisions of the Contract, or portions thereof, shall be enforced to the fullest extent permitted by law. All amendments must be executed by the parties in accordance with Section 1. of these Commonwealth Terms and Conditions and filed with the original record copy of a Contract as prescribed by CTR. The printed language of the Standard Contract Form, as officially published by ANF, CTR and OSD, which incorporates by reference these Commonwealth Terms and Conditions, shall supersede any conflicting verbal or written agreements relating to the performance of a Contract, or attached thereto, including contract forms, purchase orders or invoices of the Contractor. The order of priority of documents to interpret a Contract shall be as follows: the printed language of the Commonwealth Terms and



## COMMONWEALTH TERMS AND CONDITIONS

Conditions, the Standard Contract Form, the Department's Request for Response (RFR) solicitation document and the Contractor's Response to the RFR solicitation, excluding any language stricken by a Department as unacceptable and including any negotiated terms and conditions allowable pursuant to law or regulation.

IN WITNESS WHEREOF, The Contractor certifies under the pains and penalties of perjury that it shall comply with these Commonwealth Terms and Conditions for any applicable Contract executed with the Commonwealth as certified by their authorized signatory below:

CONTRACTOR AUTHORIZED SIGNATORY: \_\_\_\_\_

(signature)

Print Name: Kim Roy

Title: Chair, Board of Selectman

Date:

(Check One): ☒ Organization ☐ Individual

Full Legal Organization or Individual Name: Town of Halifax

Doing Business As: Name (If Different):

Tax Identification Number: 04-6001167

Address: 499 Plymouth Street, Halifax, MA 02338

Telephone: 781-294-1316

FAX: 781-294-7684

### INSTRUCTIONS FOR FILING THE COMMONWEALTH TERMS AND CONDITIONS

A "Request for Verification of Taxation Reporting Information" form (Massachusetts Substitute W-9 Format), that contains the Contractor's correct TIN, name and legal address information, must be on file with the Office of the Comptroller. If the Contractor has not previously filed this form with the Comptroller, or if the information contained on a previously filed form has changed, please fill out a W-9 form and return it attached to the executed COMMONWEALTH TERMS AND CONDITIONS.

If the Contractor is responding to a Request for Response (RFR), the COMMONWEALTH TERMS AND CONDITIONS must be submitted with the Response to RFR or as specified in the RFR. Otherwise, Departments or Contractors must timely submit the completed and properly executed COMMONWEALTH TERMS AND CONDITIONS (and the W-9 form if applicable) to the: *Payee and Payments Unit, Office of the Comptroller, 9th Floor, One Ashburton Place, Boston, MA 02108* in order to record the filing of this form on the MMARS Vendor File. Contractors are required to execute and file this form only once.



COMMONWEALTH OF MASSACHUSETTS  
OFFICE OF THE COMPTROLLER  
Electronic Funds Transfer Sign Up Form

This form should be sent to a department with whom you do business.

Request type must be checked: ☐ Initial Request ☒ Changing Existing Account ☐ Closing Account

I Pamela B Adduci hereby certify that the account/s indicated on this form is under my direct control and access; therefore, I authorize the State Treasurer as fiscal agent for the State of Massachusetts to initiate, change or cancel credit entries to that account/s as indicated on this form. For ACH debits consistent with the International ACH Transaction (IAT) rules check one:

☐ I affirm that payments authorized hereunder are not to an account that is subject to being transferred to a foreign bank account.

☐ I affirm that payments authorized hereunder are to an account that is subject to being transferred to a foreign bank account.

This authority is to remain in full force and effect until the Office of Comptroller has received written notification, from either me or an authorized officer of organization of the account's termination in such time and in such a manner as to afford CTR a reasonable opportunity to act upon it.

VENDOR BANK INFORMATION

Vendor Bank Name: Rockland Trust  
Vendor Bank Transit Number (ABA): 011304478  
Vendor Bank Account Number: 2241161  
Account Type: Checking

Filling out this field is a requirement for changing account number

Vendor Bank Old Account Number: \_\_\_\_\_  
Account Type: \_\_\_\_\_

VENDOR INFORMATION

Vendor Tax Identification Number (TIN): 04-6001167  
Vendor/Business Name: Town of Halifax  
Vendor Contact Name: Pamela Adduci - Treasurer  
E-mail: padduci@town.halifax.ma.us  
Telephone: 781 294 8381  
Address: 499 Plymouth Street  
City: Halifax State: MA Zip: 02330

This authorization will remain in effect until either canceled in writing or an updated form changing information is sent to the Department you currently do business with.

AUTHORIZED SIGNATURE: Pamela B Adduci  
Print Name: Pamela Adduci Title: Treasurer Date: 5-13-16

Form forwarded to Commonwealth Department: \_\_\_\_\_  
Attached voided check here:





TOWN OF HALIFAX  
*Commonwealth of Massachusetts*

OFFICE OF THE BOARD OF SELECTMEN  
499 PLYMOUTH STREET  
HALIFAX, MA 02338

TEL: 781-294-1316  
FAX: 781-294-7684

The Town of Halifax has a statutory mandate under law to guarantee equal treatment for all who seek access to its services or opportunities for employment and advancement. No discrimination will be tolerated on the basis of race, creed, political affiliation, color, sex, national origin, age, or handicap. The ultimate goal is for personnel of this organization to reflect the proportions of minority, female, and handicapped persons in the populations they serve.

The Town of Halifax will meet its legal, moral, social, and economic responsibilities for Equal Employment Opportunity/Affirmative Action as authorized and required by all pertinent state and federal legislation, executive orders and rules and regulations, including the following:

1. Title II of the Civil Rights Act of 1964 (42 USC s2000e et seq., which prohibits discrimination in employment on the basis of race, color, religion, sex, or national origin; and
2. The Age Discrimination in Employment Act of 1967 (29 USC s621 et seq.), which prohibits discrimination in employment on the basis of age with regard to those individuals who are at least 40 years of age, but less than 65 years of age; and
3. Section 504 of the Rehabilitation Act of 1973 (29 USC s794), and the regulations promulgated pursuant thereto (45 CFR Part 84), which prohibit discrimination against qualified handicapped individuals on the basis of handicap and requires employers to make reasonable accommodations to known physical or mental limitations of otherwise qualified handicapped applications and employees; and
4. M.G.L. c. 151B s4 (1), as amended by Chapter 533, 1983, which prohibits discrimination in employment on the basis of race, color, sex, religious creed, national origin, ancestry, age or handicap,


In addition, the Provider agrees to be familiar with and abide by:

- \* Massachusetts Executive Order 524
- \* Massachusetts Executive Order 526
- \* Equal Pay Act of 1963
- \* Massachusetts Architectural Barriers Board Act
- \* Federal Executive Orders 11246 and 11375 as amended.

All employees, unions, sub contractors and vendors must make genuine and consistent efforts:

1. To ensure equal employment opportunities for present and future employees, and
2. To implement affirmative action, as legally required, to remedy the effects of past employment discrimination and social inequalities.

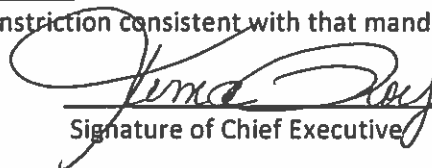
The responsibility for implementing and monitoring this policy has been delegated to:

 , Chairman, Board of Selectmen  
Name and Title of Employee

Furthermore, The Town of Halifax

prohibits that any employee, or applicant, be subjected to coercion, intimidation, interference or discrimination for filing a complaint or assisting in an investigation under this program. No portion of this

Equal Employment Opportunity/Affirmative Action Policy shall be construed as conflicting with any existing or future judicial or legislative mandate where a constriction consistent with that mandate is reasonable.

  
\_\_\_\_\_  
Signature of Chief Executive

\_\_\_\_\_  
Chair, Board of Selectmen  
Title of Chief Executive

\_\_\_\_\_  
Date May 16<sup>th</sup> 2016





TOWN OF HALIFAX  
*Commonwealth of Massachusetts*

OFFICE OF THE BOARD OF SELECTMEN  
499 PLYMOUTH STREET  
HALIFAX, MA 02338

TEL: 781-294-1316  
FAX: 781-294-7684

**Statement of Intent**

The Section 319 Nonpoint Source Competitive Grant Program asks that minimum Fair Share DBE Utilization Goals will be met or exceeded for this project. The Town will be attentive in utilizing the goals of 3.40%D/MBE and 3.80% D/WBE for any contract, goods or equipment for this project.

May 16, 2016  
Date

Kim Roy  
Authorized Signatory  
Town of Halifax  
Kim Roy/ Chair, Board of Selectmen

## **Letter(s) of Support**





*The Commonwealth of Massachusetts*

HOUSE OF REPRESENTATIVES  
STATE HOUSE, BOSTON 02133-1054

**THOMAS J. CALTER**  
**STATE REPRESENTATIVE**  
12<sup>TH</sup> PLYMOUTH DISTRICT

ROOM 448, STATE HOUSE  
TEL. (617) 722-2480  
FAX: (617) 722-2353

DISTRICT OFFICE:  
10 CORDAGE PARK CIRCLE, SUITE 233  
PLYMOUTH, MA 02360  
TEL: (508) 732-0034

May 27, 2016

Jane Peirce, MassDEP  
319 Nonpoint Source Program Manager  
8 New Bond Street  
Worcester MA 01606

Dear Ms. Peirce:

I have witnessed and worked with the Town of Halifax's efforts to restore the health of the Monponsett Ponds for many years now. I applaud their hard work, many approaches and measures to improve the natural flow of the ponds and I share their hope and determination to see the Monponsett Ponds open for recreational use all year round. For many years now, we have witnessed the degradation of the West Monponsett Pond, in particular, as it is closed for most of the summer and fall due to high counts of cyanobacteria, per the Department of Public Health's protocol.

Therefore, I write to you now in full support of Halifax's latest effort in their battle against the algal blooms preventing recreational use of the West Monponsett Pond. Last year's Alum treatment appears to have helped, as the numbers of cyanobacteria were lower but, unfortunately, not low enough to open the beaches.

As the Town of Halifax cannot afford to bear the financial burden of continued Alum treatments, it is my hope that their application for EPA's 319 Nonpoint Source Program, requesting funding for future Alum treatments will be granted. I strongly support Halifax's proposal, as it addresses a critical public health and environmental health issue and will allow people to once again enjoy the ponds, rather than avoid them.

Thank you for your time in consideration of this letter and of Halifax's proposal.

Sincerely,

A handwritten signature in blue ink that reads "Tom J. Calter".

Thomas J. Calter

State Representative

# Support for West Monponsett Alum Treatment

Application for 319 Non-Point Source Pollution Competitive Grant Program

1. <del>Paul Collis</del>	PAUL COLLIS
2. <del>Joanne M. Lunt</del>	Juane M. Uranitte
3. <del>Jim Wright</del>	Jim Wright
4. <del>John J. McDermott</del>	JOHN J. McDERMOTT
5. <del>Ellen Fritzel</del>	<del>Ellen Fritzel</del>
6. <del>Bob McCreary</del>	<del>Bob McCreary</del>
7. <del>Helen Collis</del>	Helen Collis
8. <del>Matthew Power</del>	Matthew Power
9. <del>Gabriella Cardozo</del>	<del>Gabriella Cardozo</del>
10. <del>Matthew Silva</del>	Matthew Silva
11. <del>Suzanne Little</del>	Suzanne Little
12. <del>Marianne Moore</del>	Marianne Moore
13. <del>Donna Barrows</del>	Donna Barrows
14. <del>Steve Little</del>	Steve Little
15. <del>Joanne Brennan</del>	Joanne Brennan
16. <del>Patti Kirkland</del>	PATTI KIRKLAND
17. <del>Joanne S. Kelley</del>	Joanne S. Kelley
18. <del>Michelle Caputo</del>	Michelle Caputo
19. <del>Paul E. Deneen</del>	Paul E. Deneen
20. <del>Joseph Gaudet</del>	Joseph Gaudet
21. <del>Kelly Clark</del>	Kelly Clark
22. <del>Thomas Deneen</del>	Thomas Deneen
23. <del>Kelly A. Raymond</del>	Kelly A. Raymond
24. <del>Tam Hanfield</del>	TAM HANFIELD
25. <del>Claire Goguen</del>	CLAIRE GOGUEN
26. <del>Maxwell Corsini</del>	Maxwell Corsini
27. <del>Joseph Godas</del>	JOSEPH GODAS
28. <del>James Daigle</del>	James Daigle
29. <del>Donald Pappas</del>	Donald Pappas
30. <del>Seth Goodman</del>	Seth Goodman

# Support for West Monponsett Alum Treatment

## Application for 319 Non-Point Source Pollution Competitive Grant Program

91.	Mary Carter	Mary CARTER
92.	<del>Frank Nogueira</del>	FRANK NOGUEIRA
93.	my friend	Michael J. Floridia
94.	<del>Robert Shea</del>	Robert Shea
95.	Kathy O'Brien	Kathleen O'Brien
96.	John Alexander	John Alexander
97.	David McGarr	David McGarr
98.	Rich Frechrick	Rich Frechrick
99.	Bill Gurnell	Bill Gurnell
100.	Mike Williams	Mike Williams
101.	Rose Yourell	ROSE YOURELL
102.	Laura Corkery	Laura Corkery
103.	Gary Heikkila	Gary Heikkila
104.	Deborah Babineau	Deborah Babineau
105.	Kevin Berry	Kevin Berry
106.	James Corrigan	James Corrigan
107.	David Wallace	David Wallace
108.	Kenneth Frederick	KENNETH FREDERICK
109.	Frank B. Russell	Frank B. Russell
110.	Ryan Elsmore	Ryan Elsmore
111.	Christy Pizzelli	Christy Pizzelli
112.	Joshua Grab	Joshua Grab
113.	Joseph Gagne	Joseph GAGNE
114.	Ryan Wilson	Ryan Wilson
115.	William J. Taylor	William J. Taylor
116.	Joyce L. Lafard	JOYCE L. LAFARD
117.	Sandra Zervas	Sandra Zervas
118.	Dick Zervas	Dick ZERVAS
119.	MATT KELGORE	Matt Kelgore
120.	GRANT CULLEN	Grant Cullen

# Support for West Monponsett Alum Treatment

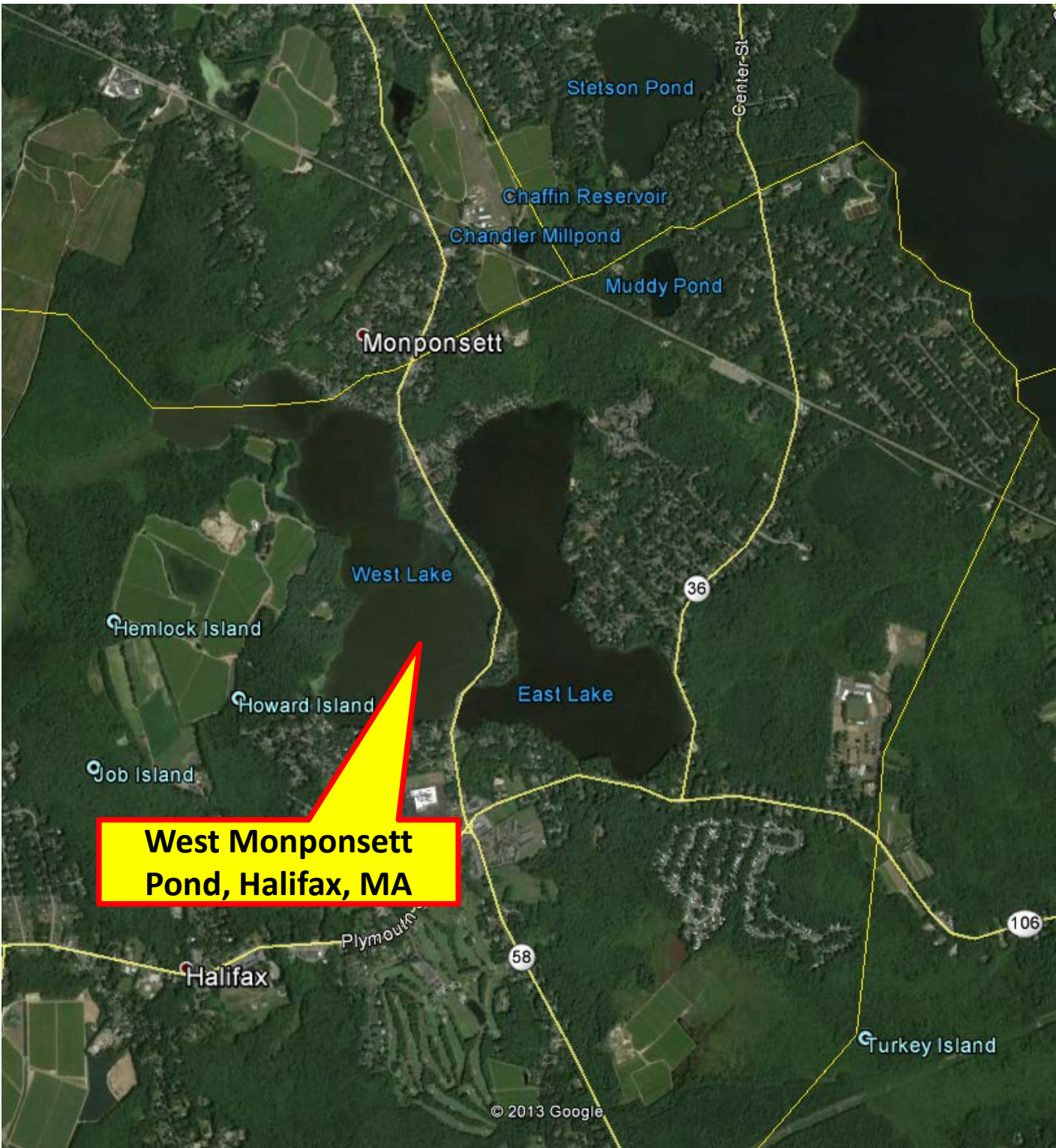
## Application for 319 Non-Point Source Pollution Competitive Grant Program

31.	Mark E Cowing	MARK E COWING
32.	Priscilla Donahue	PRISCILLA DONAHUE
33.	Cody Edwards	Cody Edwards
34.	Danielle Styke-Barrows	Danielle Styke-Barrows
35.	Nola Morrill	Nola Morrill
36.	Thomas Cline	THOMAS CLINE
37.	Douglas Gile	DOUGLAS GILE
38.	Calvin D. Waters	Calvin D. Waters
39.	Robert Gawn	ROBERT GAWN
40.	William McDonald	William McDonald
41.	Stephen R. O'Donnell	STEPHEN R O'DONNELL
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## Figures

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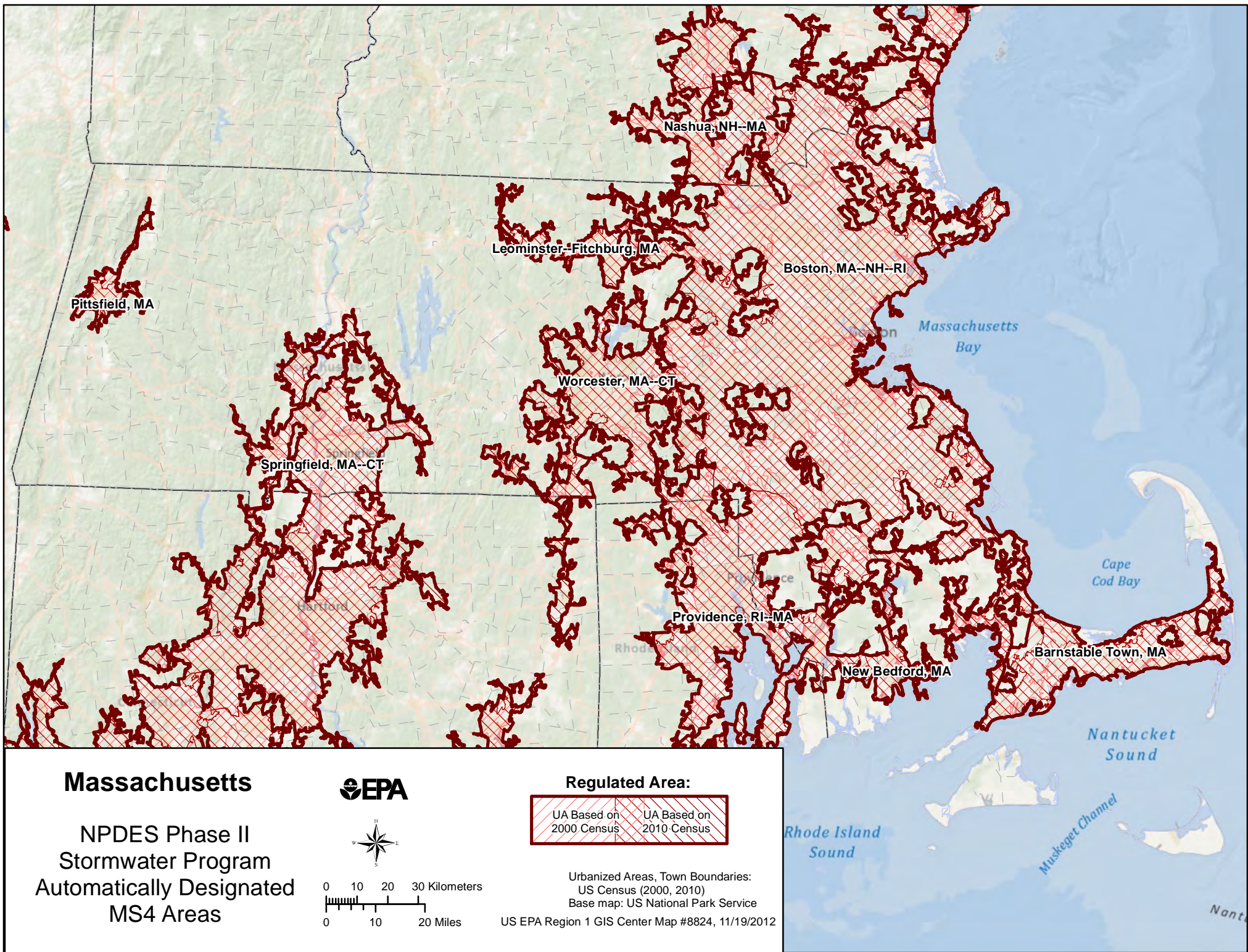




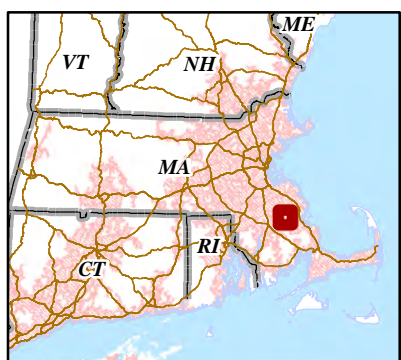
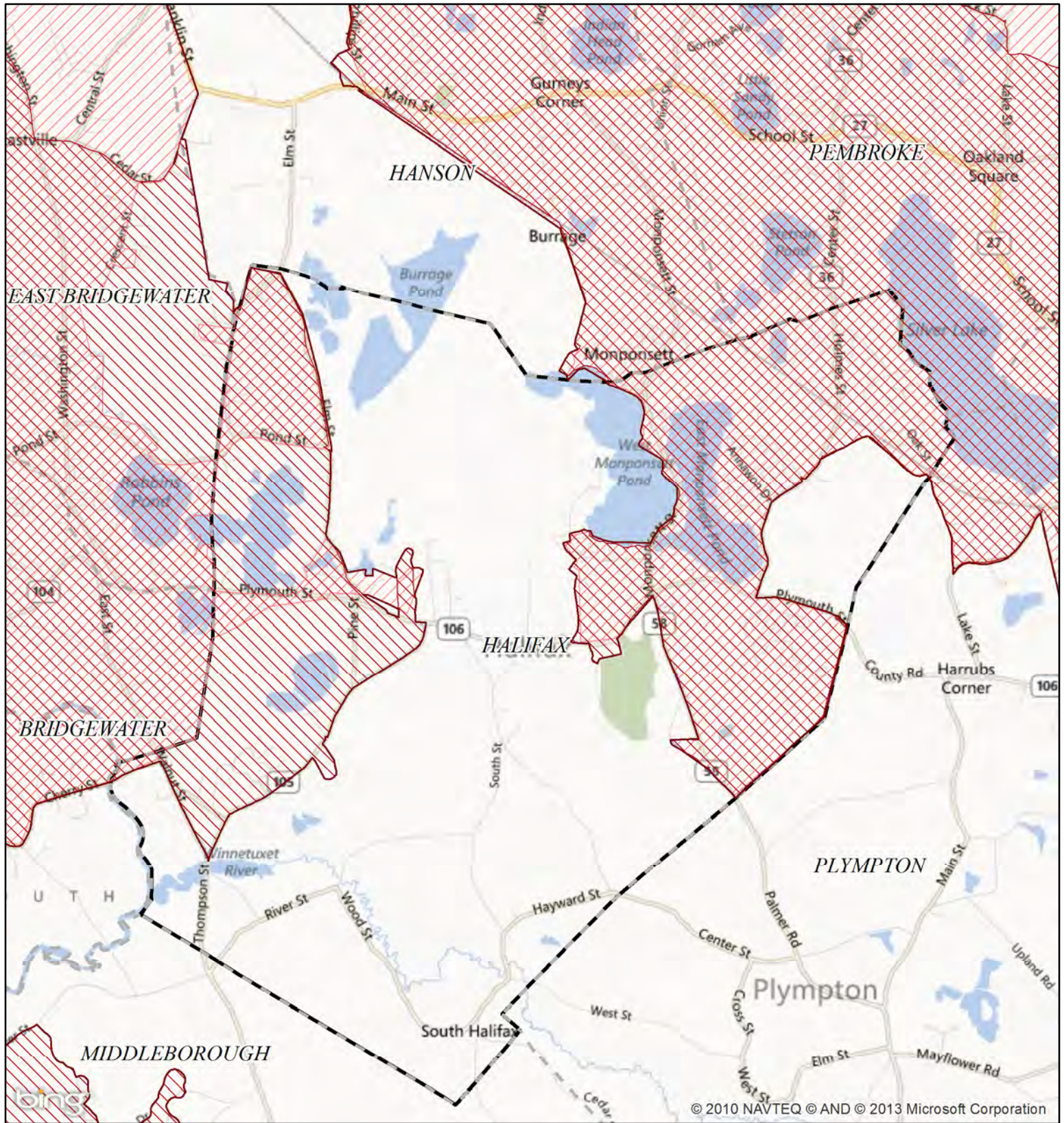
**Figure 1 – Project Locus**







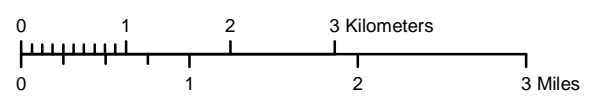




# NPDES Phase II Stormwater Program Automatically Designated MS4 Areas

## Halifax MA

Regulated Area:



Town Population: 7518  
Regulated Population: 5416  
(Populations estimated from 2010 Census)



Urbanized Areas, Town Boundaries:  
US Census (2000, 2010)  
Base map © 2013 Microsoft Corporation  
and its data suppliers



## **Attachment 1**

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- **Cyanobacteria and Public Health Articles**

# Algae triggering ALS?

NH researchers part of international effort to uncover link

By Ryan Lessard  
news@hippopress.com

William Gilmore, 60, of Rochester was a self-employed carpenter for most of his life. Gilmore built gazebos and decks and rebuilt kitchens. He was also an avid kayaker, scuba diver, surfer, fisher and bicyclist.

"I played just as hard as I worked hard," Gilmore said.

But, in 2011 he started to notice that his pneumatic tools and saws were getting too heavy for him — a 6'2", 210-lb., well-built man. His right arm had become weak.

"I thought I had an injury, work- [or] sports-related," Gilmore said. "I was on my own for about a year just thinking that I could heal my injury and then when I realized there was something more going on with my right side, I went to see the Seacoast Orthopedic Group and they did a bunch of tests."

At first, Gilmore says, doctors misdiagnosed the problem as something that would require time and physical therapy to overcome. But instead of getting better, his condition worsened. When it began to affect his left side as well in 2014, he went to Brigham and Women's Hospital in Boston for second opinion. There, he was diagnosed with a form of amyotrophic lateral sclerosis, or ALS, that he says is different from the fast-acting form that killed Lou Gehrig.

"It's a slow progression and, for the most part, it stays in the upper body," Gilmore said. Today, his wife helps him do basic things.

"My arms don't work. I can't lift anything. I can't hold a pen, I can't feed myself, can't wash myself. It's a pretty nasty setup," Gilmore said.

He says by 2014, he wouldn't pick up a full cup of water.

"I couldn't trust my hands that I wasn't going to let it fall," Gilmore said.

And he's constantly reminded of his loss by the many relics of his bygone days as an

active outdoorsman.

"All those things, my kayak, my dive gear, my surfboards, my bicycles, I can't use any of it anymore," Gilmore said.

## Possible cause

Scientists are finding a mounting body of evidence that Gilmore's years living and working near coastline and shoreline may be at least one key factor that led to his disease. That's because several lakes and ponds Gilmore and others have interacted with are often host to cyanobacteria, also known as blue-green algae.

The cyanobacteria, in turn, produce a toxin, known as BMAA, in which recent studies have shown correlates with high rates of ALS when ingested.

Dr. Elijah Stommel, a neurologist at Dartmouth-Hitchcock Medical Center who works with ALS patients, is one of the first scientists to discover a similar correlation in New Hampshire and the broader New England region.

"Initially it was just an exercise that I wanted some students to do for me, to see where the patients were mapped out," Stommel said. "We put them on Google Earth just to see where they were."

What they saw was surprising — clusters of ALS patients around New Hampshire lakes.

"One [cluster] was particularly interesting around Lake Mascoma in Enfield, New Hampshire, where we found a rate of ALS that's about 40 times higher than expected," Stommel said. "We've since been doing a lot of mapping of ALS patients in northern New England."

At first, they had no idea why this clustering was taking place, but as they looked closer they noted that clustering was taking place around specific water bodies known to have significant cyanobacterial blooms.

"We've since found BMAA in some of these water bodies, so I think there's a pretty strong link. It doesn't prove anything," Stommel said.

He and his team identified patients living in those clusters who had never swum in nor eaten any fish from the lake they lived near. This led them to investigate the possibility that patients had been inhaling cyanobacteria from the air, something that's possible during its blooming season.

"We set up aerosol collectors, and we've actually been able to find cyanobacteria in the filters of these aerosol collectors over a relatively short time, just a few hours," Stommel said. They also detected traces of cyanobacteria in patients' lungs.

Moving forward, Stommel wants to map out patients around Lake Erie, which has been known to suffer severe cyanobacterial blooms, in an effort to get closer to understanding the risk factors involved.

"We're trying to collaborate with the Cleveland Clinic. They have a big database of ALS patients there, and we're going to look retrospectively at the patients in that area hopefully and see if there are high rates of ALS there or clusterings of ALS and better define some of these risk factors," Stommel said.

## The science

Still, very little is known about the causes of neurodegenerative diseases like ALS

and Alzheimer's. But research papers related to the environmental links to this disease and others have begun to snowball recently, thanks in part to Stommel's work.

Just this past January, a study was published showing vervet monkeys who ingested a lifetime's worth of BMAA grew large "tangles" in the brain consistent with those found in Alzheimer's patients in a shockingly brief amount of time.

And Stommel said a scientist in France has connected a cluster of ALS patients near Montpellier with oysters and mussels eaten by patients. The shellfish originated in Thau lagoon, a cyanobacterial hotbed.

Cyanobacteria has long been known for its toxins — it produces many, some of which are deadly to humans — but it wasn't fingered as the source of BMAA until the 1970s.

Prior to that, Army doctors in the 1940s and '50s had identified BMAA in cycad seeds and bat meat as the cause of the now-famous ALS-like outbreak on the island of Guam during that time.

But there's still plenty scientists don't yet understand. Stommel says there may be genetic precursors and it may require a combination of factors not yet understood for a person to contract the neurological disease.

Another thing came out of the monkey tests that may prove helpful: a possible treatment. A batch of vervets that ate the BMAA were also given an amino acid supplement called L-serine. Those monkeys weren't in nearly as bad shape as those that didn't receive the supplements. Human trials have already begun for Alzheimer's patients and the preliminary results are expected by the end of the year.

Which is good news, since cyanobacteria — the more than 2-billion-year-old algae scientists determined last fall lent our planet's atmosphere its first breeze of oxygen — can't be easily avoided.

"These bacteria are really found everywhere. They're really ubiquitous," Stommel said.

*I can't lift anything,  
I can't hold a pen, I  
can't feed myself, can't  
wash myself. It's a  
pretty nasty setup.*

WILLIAM GILMORE

# Are Algae Blooms Linked to Lou Gehrig's Disease? - Scientific American

Thursday, March 24, 2016 11:11 AM

## Are Algae Blooms Linked to Lou Gehrig's Disease?

Medical researchers are now uncovering clues that appear to link some cases of ALS to people's proximity to lakes and coastal waters

- By [Lindsey Konkel](#), [Environmental Health News](#) on December 11, 2014



In New England, medical researchers are now uncovering clues that appear to link some cases of the lethal neurological disease to people's proximity to lakes and coastal waters.

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For 28 years, Bill Gilmore lived in a New Hampshire beach town, where he surfed and kayaked. "I've been in water my whole life," he said. "Before the ocean, it was lakes. I've been a water rat since I was four." Now Gilmore can no longer swim, fish or surf, let alone button a shirt or lift a fork to his mouth. Earlier this year, he was diagnosed with Amyotrophic lateral sclerosis (ALS), or Lou Gehrig's disease.

In New England, medical researchers are now uncovering clues that appear to link some cases of the lethal neurological disease to people's proximity to lakes and coastal waters.

About five years ago, doctors at a New Hampshire hospital noticed a pattern in their ALS patients—many of them, like Gilmore, lived near water. Since then, researchers at Dartmouth-Hitchcock Medical Center have identified several ALS hot spots in lake and coastal communities in New England, and they suspect that toxic blooms of blue-green algae—which are becoming more common worldwide—may play a role. Now scientists are investigating whether breathing a neurotoxin produced by the algae may raise the risk



of the disease. They have a long way to go, however: While the toxin does seem to kill nerve cells, no research, even in animals, has confirmed the link to ALS.

#### **No known cause**

As with all ALS patients, no one knows what caused Bill Gilmore's disease. He was a big, strong guy—a carpenter by profession. One morning in 2011, his arms felt weak. "I couldn't pick up my tools. I thought I had injured myself," said Gilmore, 59, who lived half his life in Hampton and now lives in Rochester, N.H.

Three years and many doctors' appointments later, Gilmore received the news in June that the progressive weakening in his limbs was caused by ALS.

Neither Hampton nor Rochester is considered a hot spot for ALS. Gilmore is one of roughly 5,600 people in the United States diagnosed each year with the disease. The average patient lives two to five years from the time of diagnosis.

There is no cure, and for the majority of patients, no known cause. For 90 to 95 percent of people with ALS, there's no known genetic mutation. Researchers assume that some unknown interaction between genes and the environment is responsible.

In recent years, some of this research has focused on blue-green algae, also known as cyanobacteria. "There's a growing awareness of the importance of gene/environment interactions with neurodegenerative diseases. There is more interest in examining environmental exposures, including exposures to cyanobacteria, as possible risk factors for sporadic ALS," said Paul Alan Cox, director of the nonprofit Institute of Ethnomedicine in Wyoming, which focuses on treatments for ALS and other neurodegenerative diseases.

Cyanobacteria—some of the oldest organisms on the planet—can occur wherever there is moisture. Blooms are fed largely by nutrients in agricultural and urban runoff.

Some cyanobacteria produce toxic compounds that can sicken people. In August, hundreds of thousands of people in Toledo, Ohio, were left without tap water for days when toxins from an algal bloom in Lake Erie were found in the water supply.

While the cyanobacteria toxin that prompted the Toledo water crisis can cause diarrhea, intestinal pain and liver problems, other toxins produced by the blue-green algae can harm the nervous systems of humans and wildlife.

Scientists have long suspected that a cyanobacteria toxin could play a role in some forms of ALS. After World War II, U.S. military doctors in Guam found that many indigenous Chamorro suffered from a rapidly progressing neurological disease with symptoms similar to both ALS and dementia. Years later, scientists found the neurotoxin BMAA in the brains of Chamorro people who died from the disease.

Cyanobacteria that grow on the roots and seeds of cycad trees produce the toxin.

Cox, a researcher in Guam in the 1990s, hypothesized that BMAA worked its way up the food chain from the cycad seeds to bats to the Chamorro who hunted them. But Cox and his colleagues also found BMAA in the brains of Canadian Alzheimer's patients who had never dined on Guam's fruit bats. In patients who had died from other causes, they found no traces of it. The source of the BMAA in the Canadians remains unknown.

Some researchers have suggested that fish and shellfish from waters contaminated with cyanobacteria blooms may be one way that people ingest BMAA. In southern France, researchers suspect ALS cases may be linked to consumption of mussels and oysters. Lobsters, collected off the Florida coast near blooms, also have been found with high levels of BMAA.

Scientists around the world are investigating how the neurotoxin gets into the body and whether it contributes to disease.

"We don't really know what exposure routes are most important," Cox said.

#### **New England's ALS hot spots**

In New Hampshire, Dartmouth neurologist Elijah Stommel noticed that several ALS patients came from the small town of Enfield in the central part of the state. When he mapped their addresses, he saw that nine of them lived near Lake Mascoma.

Around the lake, the incidence of sporadic ALS—cases for which genetics are not a likely cause—is approximately 10 to 25 times the expected rate for a town of that size.

"We had no idea why there appeared to be a cluster around the lake," Stommel said.

Based on the link between ALS and the neurotoxin in other parts of the world, Stommel and his colleagues hypothesize that the lake's cyanobacteria blooms could be a factor.

Across northern New England, the researchers have continued to identify ALS hot spots—a large one in Vermont near Lake Champlain and a smattering of smaller ones among coastal communities in New Hampshire and Maine.

Earlier this year, the researchers reported that poorer lake water quality increased the odds of living in a hot spot. Most strikingly, they discovered that living within 18 miles of a lake with high levels of dissolved nitrogen—a pollutant from fertilizer and sewage that feeds algae and cyanobacteria blooms—raised the odds of belonging to an ALS hot spot by 167 percent.

The findings, they wrote, "support the hypothesis that sporadic ALS can be triggered by environmental

lake quality and lake conditions that promote harmful algal blooms and increases in cyanobacteria.” How people in New England communities could be ingesting the neurotoxin remains largely a mystery. While fish in the lakes do contain it, not everyone in the Dartmouth studies eats fish. “We’ve sent questionnaires to patients and there’s really no common thread in terms of diet or activities,” Stommel said. “The one common thing that everybody does is breathe.” In other words, it’s possible that a boat, jet ski or even the wind could stir up tiny particles of cyanobacteria in the air, where people then breathe it in.

#### **Testing the air for a neurotoxin**

Last August, at Lake Attitash, Jim Haney, a University of New Hampshire biologist, waded knee-deep into swirling green water. Cyanobacteria were blooming at the small lake in the northeastern corner of Massachusetts. Haney had rigged up three vacuum-like devices with pipes, plastic funnels and paper to suck up and filter air near the lake’s surface.

He took the filter papers back to his laboratory and measured the cyanobacteria cells, BMAA and other toxins stuck to them.

“We want to know what level lake residents may be exposed to through airborne particles,” said Haney, who is sampling the air at Massachusetts and New Hampshire lakes in collaboration with the Dartmouth team.

Stommel said, “it’s very compelling to look at the filter paper and see it just coated with cyanobacteria.” At this point, Haney and graduate students are trying to understand under what conditions the toxins might be coming out of the lake and whether the airborne particles are an important route of exposure. Preliminary findings suggest that BMAA and other cyanobacteria cells are being aerolized. “There is potentially a large quantity of cyanobacteria that could be inhaled,” Haney said. He noted, however, that the measurements were taken about eight inches above the water’s surface, making it likely that concentrations would be much lower farther away.

While the toxins are likely to be most abundant in the air around lakes, they exist all over the planet, even in deserts.

In 2009, BMAA was even detected in the sands of Qatar. Crusts containing cyanobacteria may lie dormant in the soil for most of the year, but get kicked up during spring rainstorms. Cox and colleagues hypothesized that breathing in toxins from dust might be a trigger for a doubling of ALS incidence in military personnel after Operation Desert Storm.

Near Haney’s workstation at Lake Attitash, a child splashed in the shallow water off a dock. Haney scooped up a cupful of water. He peered at the tiny green particles in the cup that reflect the sunlight, making the mixture resemble a murky pea soup.

“We’ve developed this view of nature as idyllic, which is wonderful, but not everything in nature is benign,” he said. “Rattlesnakes are natural and you wouldn’t get too close to one of those.”

#### **“Proximity does not equal causality”**

The hypothesis that exposure to BMAA may trigger the disease in some people remains controversial. Researchers have evidence that people living close to lakes with blooms may be at increased risk for ALS. They’ve even found BMAA in the diseased brain tissue of people who have died of neurodegenerative diseases. Nevertheless, “proximity does not equal causality,” said Deborah Mash, a neuroscientist at the University of Miami in Florida.

The big, unanswered question is whether the toxin can actually cause the disease. So far, there’s little evidence to show how it could induce the type of brain changes seen in people with ALS.

Tests of human cells have found that BMAA kills the motor neurons—nerve cells that control muscles—implicated in ALS. Primates fed high levels of BMAA in the 1980s [showed](#) signs of neurological and muscular weakness. But the toxin did not kill their motor neurons.

“What is lacking at this point is a clear animal model that demonstrates that BMAA exposure results in ALS-like neuropathy,” Cox said.

So what is a possible mechanism for how the toxin may lead to the disease? The body may mistake BMAA for the amino acid L-serine, a naturally occurring component of proteins. When the toxin is mistakenly inserted into proteins, they become “misfolded,” meaning they no longer function properly and can damage cells.

Cox and colleagues soon will test two drugs in FDA-approved clinical trials. They’re about to enter second-phase testing with L-serine. The idea, explained Sandra Banack, a researcher at the Institute for Ethnomedicine, is that large doses of L-serine may be able to “outcompete” low levels of BMAA in the body, preventing it from becoming incorporated into proteins.

For ALS patients like Gilmore, the research can’t come soon enough. “If they can figure out a cause, then hopefully they can find a cure,” Gilmore said.

*This article originally ran at [Environmental Health News](#), a news source published by Environmental Health Sciences, a nonprofit media company.*

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By Paula

BIO

## Could there be a link between cyanobacteria and ALS?

*New Hampshire lakes, scientists are exploring idea*

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File Image of Cyanobacteria (Wikimedia Commons/MatthewJparker)

LEBANON, N.H. — Doctors and scientists at Dartmouth College and the University of New Hampshire are among a team exploring whether environmental toxins may be related to neurodegenerative diseases.

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They have found that cyanobacteria, formerly known as blue-green algae, may be linked to amyotrophic lateral sclerosis (ALS), or Lou Gehrig's disease.

Dr. Elijah Stommel, of the Dartmouth-Hitchcock Medical Center, and his neurological resident, Dr. Tracie Caller, began using Google Maps to plot the residences of their patients with ALS.

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"We found that people who live next to lakes with persistent cyanobacterial blooms have up to a 25-fold increased chance of developing ALS," Stommel said. "These results have been of deep concern to me and my colleagues."

Washington D.C.



The report, published a study Jan. 20 in the Proceedings of the British Royal Society indicates that chronic exposure to the environmental toxin BMAA, derived from cyanobacteria, may increase the risk of ALS and other neurodegenerative illnesses in certain individuals.

ALS is a progressive, neurodegenerative disease which causes muscle weakness and eventually respiratory failure.

More than 450,000 people worldwide have been diagnosed with the disease.

There is currently very little treatment available and once it attacks the brain and spinal cord, the life expectancy is two to five years.

Rilutek is a drug that is given, but it only extends life an average of three to five months.

While ALS is the focus, there are other diseases which may have an environmental trigger as well from these toxins, including Alzheimer's disease.

Working with the Institute for EthnoMedicine, a nonprofit medical research organization based in Jackson Hole, Wyoming and the University of Miami Brain Endowment Bank, the study looks at two separate experiments on vervet monkeys.

"Our findings show that chronic exposure to BMAA can trigger Alzheimer's-like brain tangles and amyloid deposits," said Dr. Paul Alan Cox, lead author of the study. "As far as we are aware, this is the first time researchers have been able to successfully replicate brain tangles and amyloid deposits in an animal model through exposure to an environmental toxin."

Jim Haney, professor of biological sciences, who directs the UNH Center for Freshwater Biology, and Amanda Murby, a doctoral student, are among the 50 scientists working on the project.

He said it is exciting to begin to explore whether there is an environmental trigger to these illnesses, particularly because there is so little known and so little doctors can now do to help patients.

At UNH, they have developed a system to collect aerosols produced by cyanobacteria and are working with state officials to help them test for its presence.

Cyanobacteria can be found in freshwater lakes throughout the world. These harmful blooms produce many toxins including microcystins (liver toxins) and BMAA (nerve toxins).

Exposure to large amounts of microcystins can cause liver damage. Exposure to smaller amounts can cause breathing problems, skin irritation, upset stomach and other gastrointestinal problems.

"Few studies have examined the risk to wildlife and humans from exposure to airborne cyanotoxins. However, recent research has indicated that cells may be transported as aerosols from lakes with high concentrations of cyanobacteria and microcystins. Since aerosols may be a more direct route of exposure to public health for those recreating or living by a contaminated body of water, we set out to design a method that could address the aerosolization of cyanobacteria released from lake water," Haney said.

Lakes which had cyanobacteria blooms in New Hampshire which were studied by UNH include Willard Pond in Antrim, Nippo Pond in Barrington, Lake Kanasatka in Moultonborough, Natcook Lake in Merrimack, Goose Pond in Canaan, Baboosic Lake in Amherst and Lake Attitash in Amesbury, Massachusetts.

The Dartmouth researchers studied a number of lakes in the Upper Valley and Vermont where

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their patients live, including Lake Mascoma in Enfield, New Hampshire.

Haney said, "Our preliminary research results raise concerns over potential exposure of humans and wildlife to aerosolized cells of cyanobacteria and their toxins. The methods we have developed could be useful for monitoring air in proximity to bodies of water for toxic cyanobacteria for public health purposes."

Another area of study is whether this can be transferred to crops growing near blooms of cyanobacteria.

"We have determined that microcystins may be transferred to crops. We detected microcystins in lettuce that was irrigated with water from a lake that frequently experiences blooms of cyanobacteria. Similarly, we found moderate to high levels of microcystins in blueberries grown near a lake with persistent cyanobacteria. Soil samples taken at varying distances from the shore of a cyanobacteria-dominated lake tested positive for microcystins as well as for living cyanobacteria," Haney said.

Reported incidences of harmful cyanobacteria blooms in freshwater have increased worldwide. There are frequent reports of deaths of dogs and cattle caused by drinking water contaminated with high levels of toxic cyanobacteria and as the earth warms, it is expected to increase, Haney said.

He noted that increased incidences could be that awareness has increased the number of reports.

He said UNH will be submitting a grant request to the National Institutes of Health to further study lakes in New Hampshire with cyanobacteria. He noted that researchers are also working with the New Hampshire Department of Environmental Services to set up a lab to study cyanotoxins.

DES samples more than 100 lakes and issues warnings for cyanobacteria in the summer months.

To view those warnings and find archived reports for various lakes and ponds, visit <http://des.nh.gov/organization/divisions/water/wmb/beaches/advisories.htm>.

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**To:** [Russ Kleekamp](#)  
**Subject:** Fwd: Cyanobacteria Concerns  
**Date:** Friday, April 08, 2016 9:12:29 AM  
**Attachments:** [Algae Triggering ALS.pdf](#)  
[Link between Cyanobacteria & ALS \(1\).pdf](#)  
[Are Algae Blooms Linked to Lou Gehrig's Disease - Scientific American \(2\).pdf](#)

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Hi Russ, here is the MWA statement about airborne cyanobacteria toxins.

Paul Collis  
President  
Monponsett Watershed Association

----- Forwarded message -----

**From:** Paul Collis <[pcollis@monponsettwatershed.org](mailto:pcollis@monponsettwatershed.org)>  
**Date:** Mon, Mar 28, 2016 at 10:23 AM  
**Subject:** Cyanobacteria Concerns  
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March 28, 2016

## **Cyanobacteria - A Danger to the Public Health**

The Monponsett Watershed Association (MWA) recently learned of scientific research that suggests a high concentration of cyanobacteria, or blue green algae, in our water bodies can have serious health effects. Previously public health authorities warned that physical contact with water containing high

levels of cyanobacteria could cause skin rashes, gastric distress and/or respiratory problems. Now research is showing that the cyanobacteria toxins can become airborne and can afflict people who have no physical contact with the water. Moreover, this research shows a correlation between these toxins and devastating afflictions such as amyotrophic lateral sclerosis (ALS) and Alzheimer's.

The cyanobacteria toxin research has shown that people can be afflicted by the toxins even if they do not live near the water bodies. One study suggests that the toxins have a range of 18 miles. Additionally, studies have shown that crops (lettuce, blueberries) irrigated with algae laden water contain the toxins.

The MWA has compiled three articles (attached) on this topic for your review. One article was in a weekly Concord, NH newspaper (March 17-23, 2016), the second article was from WMUR, an ABC affiliate in Lebanon, NH (January 2016), and the third article is from Scientific American (December 2014).

The threat of high concentrations of cyanobacteria toxins is a general threat, but it is particularly acute in the Monponsett Pond watershed. Blue green algae thrives in conditions where there are nutrients, warm temperatures and stagnant water.

At Monponsett Pond the nutrients come from 100 acre cranberry bog on the shores of West Monponsett Pond. This bog has a legal right under a 1964 special act to take and discharge water for irrigation purposes. Additional nutrient loading comes from septic systems and storm water runoff from surrounding roads. The summer weather provides the warmth needed for blue green algae growth. Finally, the City of Brockton has the right, granted by the 1964 law, to use Monponsett Pond as an auxiliary water supply. For decades Brockton has been manipulating the water levels in the Pond to keep the level high to meet the statutory requirements for diverting water in the winter. Brockton's management, or mismanagement, has created stagnant water every summer; ideal conditions for growth of blue green algae.

Every summer since 2008 one or both of the Monponsett Pond basins has been under a public health advisory from the Mass. Department of Public Health (MDPH). In 2015, MDPH tested West Monponsett Pond for 175 consecutive days (June-November), and a public health advisory was issued for 133 of those days.

Urgent action must be taken to combat the threat of blue green algae. The goal is not to eradicate blue green algae: that would be impossible and the algae is an essential part of nature. We should focus on reducing the concentration of this algae because it is the high concentration of cyanobacteria that produces the dangerous toxins. The MWA recommends the following action:

1. Regular, state funded testing at Monponsett Pond year round
2. No diversion of water from Monponsett Pond if testing shows an algae bloom above the MDPH guidelines
3. No diversion of water from Monponsett Pond after May 1 and fully open all gates in the Stump Brook Dam to promote natural water flow and combat stagnant water
4. Require the coordination of discharges from the Winebrook Bog on West Monponsett Pond and the opening of the gates of the Stump Brook Dam throughout the year. Reports on coordinated discharges must be submitted to the DEP and/or the Central Plymouth Water District Commission
5. Eliminate the use of phosphorus in fertilizer at the Winebrook Bog and upstream bogs that flow into West Monponsett Pond (phosphorus is the prime nutrient in blue green algae growth and is banned from residential fertilizer in Massachusetts)
6. State funded aluminum sulfate treatments in Monponsett Pond to combat cyanobacteria that exists in the Pond

Paul Collis, President, Monponsett Watershed Association

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## **Attachment 2**

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### **- Massachusetts 2014 Integrated List of Waters Excerpt**

# Massachusetts Category 5 Waters "Waters requiring a TMDL"

NAME	SEGMENT ID	DESCRIPTION	SIZE	UNITS	IMPAIRMENT CAUSE	EPA TMDL NO.
Cabot Pond	MA62029	Mansfield	8.95	ACRES	Dioxin (including 2,3,7,8-TCDD)	
Cain Pond	MA62030	Taunton	2.768	ACRES	Pentachlorophenol (PCP)	
Fulton Pond	MA62075	Mansfield	9.328	ACRES	Oxygen, Dissolved	
Hobart Pond	MA62090	Whitman	9.05	ACRES	Turbidity	
Hodges Pond	MA62091	(Kingman Pond) Mansfield	8.972	ACRES	Dioxin (including 2,3,7,8-TCDD)	
Ireland Grove Pond	MA62094	Abington	30.804	ACRES	Pentachlorophenol (PCP)	
Lake Sabbatia	MA62166	Taunton	285.419	ACRES	(Non-Native Aquatic Plants*)	
Matfield River	MA62-32	Confluence of Beaver Brook and the Salisbury Plain River, East Bridgewater to the confluence with the Town River and the Taunton River, Bridgewater.	8.662	MILES	Excess Algal Growth	40308
Monponsett Pond	MA62119	[West Basin] Halifax/Hanson	282.79	ACRES	Fecal Coliform	
Muddy Cove Brook Pond	MA62124	Dighton	23.243	ACRES	Oxygen, Dissolved	
Norton Reservoir	MA62134	Norton/Mansfield	558.491	ACRES	Phosphorus (Total)	
Robinson Brook	MA62-14	Outlet Hersey Pond, Foxborough to confluence with Rumford River, Mansfield.	1.855	MILES	Secchi disk transparency	
					Excess Algal Growth	
					Turbidity	
					(Non-Native Aquatic Plants*)	
					Dioxin (including 2,3,7,8-TCDD)	
					Excess Algal Growth	
					Pentachlorophenol (PCP)	
					Phosphorus (Total)	
					Turbidity	
					(Physical substrate habitat alterations*)	
					Aquatic Macroinvertebrate Bioassessments	

## **Attachment 3**

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- Watershed Tour 3-25-16 Summary



## Watershed Tour 3-25-16

*"Thank you, Cyanobacteria, for opening my eyes and expanding my world."*

From microcosm to regional watershed approach, as seen through the eyes of  
Cathy Drinan, health agent for Halifax

- **Fall 2007:** MA DPH gives a short presentation to health agents about algae, telling us that CDC has awarded five-year grant to study it, as they are very concerned about the potential for health impacts.
- **Spring 2008:** The West Monponsett Pond in Halifax is chosen as one of five in the State because of its size, its being a Tributary to a Water Supply and the severity of the problem.
- **2008:** (to present): Let the Beach closures begin!
  - \*Group emails formed to spread the word on algae and closures
- **2009:** Agent seeks sign boards as an Eagle Scout Project
- **2010:** Sign boards built by Joey Garuti for his Eagle Scout Project
  - \*Another built by Twin Lakes Condos to help spread the word
  - \*West Monponsett Pond closes in May
- **2011:** The East Monponsett Pond closes due to high algae counts (after summer time diversion in response to flooding), as well as the West Monponsett Pond being closed, as usual
  - \*Fish Kills
- **2012:** Globe Article: Pond likely to be closed all summer.
  - \* Began working with civil engineer & serious angler, Russ Kleekamp on numerous grants
  - \* March 15, 2012: Kick off meeting: *Monponsett Ponds Watershed: We All Have a Stake in It!*
  - \*The Monponsett Watershed Association is born!
- **2013:** Spring, Alum treatment applied to bind Phosphorous (about \$80,000)
  - \*Halifax has spent hundreds of thousands on studies, (Lycott, Aquatic control, now SOLitude) algae treatment and invasive weed control.
- **2013:** Monponsett Working Group begins holding monthly meeting with various stakeholders: Cranberry bog owners, DEP, DER, DPH, Brockton, legislators, Audubon, Jones River Watershed, surrounding towns

- **2013:** Sustainable Water Management Initiative (SWMI) grant awarded from DPH: Monponsett Ponds and Silver Lake Use, Operations and Improvements
- **2014:** Division of Ecological Restoration recognizes Stump Brook and the Monponsett Ponds as a Priority Project, offering technical and financial support
- **2014:** EPA uses Halifax as a pilot project for their modeling tool “WMOST” (Watershed Management Optimization Support Tool)
- **2014:** Central Plymouth County Water District revived, as described in the 1964 legislature
- **2014:** Commissioners appointed to the Water District
- **2015:** Another SWMI grant awarded to study the feasibility of automated controls at the Stump Brook Dam.
- **2015:** Alum treatment (in 3 phases)
- **2016:** Another grant awarded to Halifax for Stormwater Assessment, prioritization and preliminary designs, by New England Interstate Water Pollution Control Commission (NEIWPCC)

**Quote from August 8, 2013:**

*“In the interest of compromise with the towns of Halifax and Hanson I ask that the City of Brockton seriously explore any and all alternative options for bringing drinking water into the City.”*

~ Senator Thomas Kennedy to Mr. Larry Rowley, Superintendent of Utilities for the City of Brockton

Thank you for your time today,

Cathleen Drinan, Health Agent, Halifax Board of Health

Central Plymouth County Water District Advisory Board

499 Plymouth St.

Halifax, MA 02338

W: 781 293 6768

C: 781 727 0014

## **Attachment 4**

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- SOLitude Lake Management's Proposal
- GHD Inc. and SOLitude Lake Management Qualifications

## **West Monponsett Pond Nutrient Management Contract**

WATERBODY NAME: West Monponsett Pond

CONTRACT TERM: March 1, 2016 through December 31, 2016

TO: Charlie Seelig, Town Administrator

SUBMITTED BY: Keith Gazaille, Regional Director/Senior Biologist

SPECIFICATIONS: Perform Buffered Alum Treatment(s) and Associated Monitoring

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### **SCOPE OF SERVICES**

Permitting: The Orders of Conditions (OOC) from the Hanson and Halifax Conservation Commissions issued for the nutrient management program at West Monponsett Pond remain valid until 2019. SOLitude Lake Management will prepare and file a *License to Apply Chemicals* permit from MA DEP for the application of aluminum sulfate and sodium aluminate to the pond.

Monitoring: SOLitude will perform all of the NHESP required monitoring outlined in the approved REVISED Management Plan.

- Short-term mussel monitoring per
- (18) water quality samples (3 samples once per month April-September) analyzed for phosphorus, pH, alkalinity and turbidity
- (6) algae samples (1 sample per month April-September) for species identification and general abundance/dominance

### Buffered Alum

Treatment(s): Perform three low-dose buffered alum treatments spaced approximately one month to six weeks apart (late April-early May, early-mid June, mid-late July).

- Initial aluminum sulfate and sodium aluminate treatment targeting an aluminum dose of approximately 1.5 ppm throughout all areas greater than 4 ft. in depth (~235 acres) – treatment will be performed over two consecutive days
- (2) follow-up lower dose buffered alum treatments targeting an aluminum dose of approximately 0.75 ppm.

### Project

Reporting: A final written report will be developed that outlines the treatment tasks performed. The report will also provide an evaluation of the results of the mussel, water quality and algae monitoring. These results will then be used to evaluate the efficacy of the program and the feasibility of possible improvements/modifications.

**Competitively Sensitive & Proprietary Materials** – The information contained herein is the intellectual property of SOLitude Lake Management. Recipient may not disclose to any outside party any proprietary information, processes, or pricing contained in this document or any of its attachments without the prior written consent of SOLitude Lake Management. This document is provided to the recipient in good faith and it shall be the responsibility of the recipient to keep the information contained herein confidential.

General:

1. Contractor is a licensed pesticide applicator in the state in which service is to be provided.
2. Individual Applicators are Certified Pesticide Applicators in Aquatics in the state in which service is to be provided.
3. All chemical applications made directly to the water as specified in this contract will meet or exceed all of the contractor's legal regulatory requirements as set forth by the EPA and related state agencies for NPDES and FIFRA. Contractor will perform treatments that are consistent with NPDES compliance standards as applicable in and determined by the specific state in which treatments are made. All staff will be fully trained to perform all applications in compliance with all federal, state, and local law.
4. Contractor will continue to maintain all appropriate licensing necessary to perform all specified work in a safe and legal manner throughout the entire contract period.
5. Contractor will furnish personnel, equipment, boats, materials, and other items required to provide the foregoing at his expense.
6. Contractor is dedicated to environmental stewardship in all of its work and maintains a diligent program to recycle all plastic containers, cardboard, paper and other recyclable wastes generated through the performance of our contract work.
7. Contractor will maintain general liability and workman's compensation insurance.
8. Contractor shall be reimbursed by the client for any non-routine expenses, administrative fees, compliance fees, or any other similar expense that are incurred as a result of requirements placed on the contractor by the client that are not covered specifically by the written specifications of this contract.
9. The client agrees to pay penalties and interest in the amount of 2% per month for all past due invoices and related account balances in excess of 30 days past due from the due date as specified by the contract and as stated on the relevant invoice presented to the client.
10. Neither party may assign this Agreement without the written consent of the other party; provided, that Company may assign this Agreement upon the merger, reorganization, consolidation, change of control or sale of all or substantially all of the assets of Company. This Agreement shall inure to the benefit of, and be binding upon, the parties and their respective successors and permitted assigns.
11. The client covenants and agrees to pay reasonable attorney's fees and all other related costs and expenses of SŌLitude Lake Management® for collection of past due invoices and account balances and for any other actions required to remedy a material breach of this contract.



PROGRAM COST & PAYMENT SCHEDULE

Project Task	Cost
Permitting	\$250
Monitoring	\$7,575
Alum Treatment	\$60,650
Reporting	\$1,250

West Monponsett Nutrient Management Total Program Cost ..... \$69,725

The above total program will be invoiced according to the following schedule. Payment of submitted invoices will be due, in full, within 30 days of the issuance of each invoice.

- April 1 - \$8,715
- May 1 - \$17,431
- June 1 - \$17,431
- August 1 - \$17,431
- September 1 – 8,717

APPROVED:

*Marc D Belland*

SOLitude Lake Management®

(Authorized Signature)

Town of Halifax

(Print Name and Title)

(Date)

# Keith Gazaille

*Senior Biologist and Regional Director*

Keith Gazaille is an aquatic ecologist for SOLitude Lake Management who serves as the regional leader of the New England region based in central Massachusetts. Keith has worked in the lake and pond management industry since 1998 and has been responsible for the design, permitting and implementation of hundreds of management programs across the Northeast. His direct project experience includes fisheries and wildlife habitat improvement, aquatic, wetland, and upland invasive species control, water quality enhancement, nutrient management, aeration, dredging and watershed management to name a few. Keith is a licensed aquatic pesticide applicator in Massachusetts, Rhode Island, and Connecticut and also holds Mosquito/Biting fly and Right of Way pesticide certifications in Rhode Island and Connecticut, respectively. He is also a Certified Invasive Species Manager by the Rhode Island Coastal Resources Management Council and is experienced with feasibility assessments and regulatory compliance monitoring and reporting.



Keith has served as the lead project manager for many of SOLitude's larger and more sensitive projects in the Northeast, having developed and performed invasive species control programs and rare and endangered species habitat management for the US Fish and Wildlife Service, The Nature Conservancy, MA Fish and Wildlife's Natural Heritage Program, US Army Corps of Engineers, The Audubon Society, RI Fish and Wildlife, and the MA Department of Conservation and Recreation. He is active in a number of professional organizations such as the Northeast Aquatic Plant Management Society and the North American Lake Management Society. Through his involvement with these organization and other continuing education programs, Keith stays current with the latest technologies and management protocols.

Keith received a Bachelor of Science degree in Biology with a Wildlife concentration from Framingham State University in Framingham, MA in 1995. Prior to beginning his lake management career with Aquatic Control Technology, Keith worked under a state grant to collect data on the nesting and fledging habits of federally threatened piping plovers on Martha's Vineyard. He also served as an operations manager for an area property management company that provided landscape maintenance, turf management and invasive species control services.

In his spare time, Keith hobbies and interests include saltwater fishing, waterfowl hunting, woodworking and boating. He also enjoys spending time with his wife and two daughters.



## Russell H. Kleekamp. EIT Project Engineer



Qualified. B.S. (2003), Environmental Engineering, Northeastern University;  
National Association of Sewer Service Contractors Pipeline Assessment and  
Certification Program Certified, Certificate #U-306-2904;  
MA Engineer-In-Training, Certificate #21087;  
USACE CQC Training, Certificate #NAE-0012-00300  
OSHA 10 - Construction

Connected. Water Environment Federation; American Society of Civil Engineers;  
Monponsett Watershed Association

Relevance to project. Mr. Kleekamp has 12 years' experience in civil and  
environmental engineering project management, focusing on the planning,  
modeling, design and construction of roads, water, drainage, sewer, industrial  
coating, building renovation, coastal stabilization and solid waste systems for  
residential, commercial, municipal and federal clients. Mr. Kleekamp has performed  
design-bid-build services for municipal construction projects and also has served as  
program manager for several federal design-build projects. His experience also  
includes extensive work securing and managing grant funding for municipal  
infrastructure projects.

### Stormwater Experience:

#### Project Manager

Town of Provincetown | Provincetown,  
Massachusetts

**Commercial Street Phase III.** Project manager for the final design of over 2,000 linear feet of porous asphalt installed on Commercial Street. This is the third phase of a multi-year 10M effort to revitalize downtown Provincetown. Project responsibilities included review of final design, scheduling, public participation, meeting attendance, and construction management. This project was funded by a 2M MassWORKs grant that was also written and submitted by GHD on behalf of the Town of Provincetown.

#### Project Manager

Town of Halifax | Halifax, Massachusetts

**East and West Monponsett Ponds Stormwater Outfall Assessment.** Project manager for the stormwater assessment to identify, address, prioritize, and develop designs to mitigate the various sources of stormwater pollution to the East and West Monponsett Ponds. These ponds have been plagued with harmful Cyanobacteria blooms

due to numerous factors including stormwater pollution. This project is funded through a \$70,000 grant by the Southeastern New England Program Water Quality Management that was also written and submitted by GHD on behalf of the Town of Halifax.

#### Project Principal

Town of Falmouth | Falmouth,  
Massachusetts

**Parking Facility Design.** Development of an 18+ acre parking facility to hold approximately 1,900 parking spaces for The Steamship Authority. This project includes over 15 acres of porous asphalt and at time of construction will be one of the largest porous asphalt facilities on the East Coast. The project includes extensive site redevelopment at it is located at a former precast concrete facility. Project elements include site demolition, geotechnical investigations, 21E and other environmental investigations, extensive electrical design for lighting, and site features along with a combination office building and public restroom. Mr. Kleekamp oversaw each design phase as the project manager and principal contact for the client. Responsibilities included management of design, cost estimates, specifications (two





separate contracts), permitting, public meetings, and construction management.

Project Engineer

Town of Falmouth | Falmouth,  
Massachusetts

*Recharge Beds 14 and 15.* Project involved construction of five acres of sand infiltration beds for the expansion of the Falmouth Wastewater Treatment Plant. Responsibilities included review of shop drawings, coordination with site contractors, hosting meetings, review of RFIs and other construction-related correspondence.

Project Principal

Town of Orleans | Orleans,  
Massachusetts

*Town-wide Stormwater Mapping.* Project involved stormwater mapping of all drainage infrastructure. Project responsibilities included the scheduling, oversight, and development of a GIS compatible town-wide stormwater map showing all drainage infrastructure, including over 1,200 structures within public roads. Compilation of all information was used by multiple departments within the Town for wastewater, highway, and other related planning assignments.

Project Manager

Town of Provincetown | Provincetown,  
Massachusetts

*Various Grant Developments.* Grant development, final design, and construction management of the following grant funded projects, total of \$1.9M:

- Good Templar Place Reconstruction, \$163,000 NRCS Water Resource Restoration Grant
- Commercial Street Reconstruction Preliminary Design, \$94,000 MassDEP 604(b) Grant
- Commercial Street Reconstruction Final Design & Construction, \$1M MassWORKS Grant
- 252 Bradford Street Reconstruction, \$182,000 MassDEP Section 319 Grant
- Court Street Outfall Rehabilitation, \$152,000 MassDEP Section 319 Grant
- West End Lot Outfall Rehabilitation, \$100,000 MA CZM Grant
- Atlantic Avenue Outfall Rehabilitation, \$80,000 MA CZM Grant

- 1 Commercial Street Outfall Rehabilitation, \$116,000 MA CZM Grant

Project Manager

Town of Orleans | Orleans,  
Massachusetts

*Various Grant Developments.* Grant development, final design, and construction management of the following grant funded projects, total of \$520,000:

- Priscilla Landing, Gilman Road, Twiss Road, Quanset Road, River Road, and Barley Neck Stormwater Improvements, \$400,000 NRCS Water Resource Restoration Grant
- Skaket Beach Culvert Replacement, \$25,000 MA CZM Grant
- Windmill Park Stormwater Improvements, \$50,800 MA CZM Grant
- Town Cove Bio-Filter, \$40,000 MA CZM Grant

Project Manager

Town of Brewster | Brewster,  
Massachusetts

*Various Grant Developments.* Grant development, final design, and construction management of the following grant funded projects, total of \$520,000:

- Paines Creek Beach and Saints Landing Stormwater Improvements, \$284,000 NRCS Water Resource Restoration Grant
- Stony Brook Road Reconstruction, \$500,000 MA DEP 319 Grant
- Paines Creek Road & Route 6A Triangle Design, \$58,000 MA DEP 604(b) Grant
- Paines Creek Road South Final Design, \$14,000 MA CZM Grant

Project Manager

Town of Bourne | Bourne, Massachusetts

*Various CPR Grants.* Final design of stormwater improvement projects as part of the CPR grant from the MA Office of CZM:

- Conservation Pond Stormwater Improvements, 2005
- Buttermilk Way Stormwater Improvements, 2012, 2013, 2014





Project Manager

Town of Plymouth | Plymouth,  
Massachusetts

*Manomet Road Wick Well.* Installation of the Manomet Road wick well providing infiltration to a depth of 90 feet below grade. This installation was recommended to reduce coastal bank erosion from lateral movement of stormwater above a confined clay layer.

Project Manager

Town of Wareham | Wareham,  
Massachusetts

*Various Stormwater Grants.* Development, preparation and submission of several stormwater grants for the Town of Wareham, MA including:

- Buzzards Bay Mini Grant – Merchant's Way Outfalls, \$20,000
- Buzzards Bay Mini Grant – Besse Park, \$20,000
- s. 319 Grant – Merchant's Way, \$700,000
- Southern New England Coastal Watershed Restoration Program Nutrient Management Grant Application – Wareham WPCF Monitoring, \$120,000
- CZM Coastal Community Resilience Grant Program FY15, Pump Station Assessment, \$125,000

Roadway Experience:

Project Manager

Town of Wareham | Wareham,  
Massachusetts

*Downtown Wareham Streetscape Improvements Project, Phase I and II.* Construction representation for Phases I and II. Project responsibilities included the review and interpretation for field change orders, requests for information, and ensuring construction was in accordance with the contract documents. The project was funded through a CDB Grant.

Project Manager

Town of Wareham | Wareham,  
Massachusetts

*Merchant's Way Revitalization.* Project responsibilities included oversight and

management of topographic survey; hazardous waste delineation and removal; stormwater design; project permitting; subsurface investigation; and project planning and funding opportunities (Grant Development).

Project Manager

Town of Provincetown | Provincetown,  
Massachusetts

*Commercial Street Reconstruction Design.* This project was funded under two grants, a MassDEP 604(b) (\$94,000 grant funding) and a MassWORKs Infrastructure grant (\$1M in grant funding). This project was a joint effort with the University of New Hampshire to develop porous asphalt for implementation on Commercial Street. Project responsibilities included grant preparation, public outreach and education (there were approximately 220 businesses in the project area), meeting with Disability Commission, Conservation Commission, and Board of Selectmen on a regular basis for project updates.

Project Manager

Town of Provincetown | Provincetown,  
Massachusetts

*Bradford Street Reconstruction.* Design and construction. This project was funded under a MassDEP Section 319 grant and included the full-width reconstruction of approximately 1,000 feet of Bradford Street. Project responsibilities included the design of the stormwater facilities, coordination with the installation of new water and sewer utilities during construction, and raising the road grade by approximately 1-foot.

Project Manager

Town of Orleans | Orleans,  
Massachusetts

*Route 39 Road Reconstruction.* Full-width road reconstruction of Route 39 (approximately 3,000 linear feet) and various locations on Rock Harbor Road. Project responsibilities included full design, permitting, and construction management. Daily responsibilities included review of contractor shop drawings, coordination with testing agencies for soil and compaction field testing, documentation and record keeping, responding to contractor



request for information, development of field changes, and project closeout.

Project Manager

Town of Orleans | Orleans,  
Massachusetts

*Quanset and Gilman Road Reconstruction.* Full-width road reconstruction of Quanset Road (approximately 700 feet) and Gilman Road (approximately 1100 feet). This project was funded by the USDA's NRCS Cape Cod Water Resource Restoration Project. Project responsibilities included grant application preparation, final design (changing multiple road grades and adding stormwater structures), permitting, and construction management. Both areas were located in environmentally sensitive areas requiring onsite archeologists during excavations.

Project Manager

Town of Brewster | Brewster,  
Massachusetts

*Stony Brook Road and Setucket Road Reconstruction.* Design of full-width road reconstruction and traffic improvements for Stony Brook and Setucket Roads. This project was partially funded under a MassDEP Section 319 Grant and included the design and construction of new sidewalks, parking areas, full width paving, landscape features, brick work, stone wall design, and the re-alignment of a major intersection. Project responsibilities included management of the final design, permitting and construction of the project, coordination with testing contractors, meeting all required grant reporting, daily field reports, field change development, and other associated construction related tasks.

Project Manager

Town of Brewster | Brewster,  
Massachusetts

*Crosby Road Reconstruction.* Full-width road reconstruction design for Crosby Road Project responsibilities included permitting, final design, and attendance at several public participation events. The intent of the project was to develop a design that restored the existing width of the

roadway to 18-feet to enhance public safety and road accessibility.

Project Manager

Town of Swansea | Swansea,  
Massachusetts

*Cove Street Design and Reconstruction.* Project responsibilities included developing a design to mitigate severe flooding on an oceanfront street, attendance at Board of Selectmen Meetings, public awareness, and onsite construction assistance.

Project Manager

Town of Swansea | Swansea,  
Massachusetts

*Stormwater Improvements.* Design of stormwater improvements to Pearse and Peters Roads. Both roads had limited drainage and several areas of ponding. Project responsibilities included oversight of site survey, client correspondence, and design review.

Project Manager

Town of Chatham | Chatham,  
Massachusetts

*Main Street Infrastructure and Parking Lot Improvements.* The Town requested that a design be completed to relocate a 10-inch gravity sewer main and 36-inch storm drain in Main Street along with a design to show the reconfiguration of the existing Main Street parking lot to incorporate a manmade wetland in a low-lying area of the lot. Project responsibilities included site assessment, drafting of the proposed improvements for the parking lot, public participation and meetings, stormwater calculations, traffic management, permitting, and onsite representation during construction. The final design reconstructed Main Street from shoulder to shoulder, added 30 parking spaces to the Main Street parking lot, improved traffic flow, and incorporated low-impact development to mitigate stormwater pollution.

Project Manager

Town of Barnstable | Barnstable,  
Massachusetts

*Route 132 Widening Project.* Infrastructure improvements including the widening of State



Road Route 132 from two lanes to four lanes for a distance of two miles. Project responsibilities included design of triple sewer force mains, construction management during infrastructure installation, and SRF loan administration.

#### Project Manager

U.S. National Park Service | Rochester, Vermont

*Forest Road 45 Reconstruction.* During Hurricane Irene, over 11 inches of rain fell in the Green Mountains washing out several roads used for tourist, hiking, and maintenance activities. Mr. Kleekamp managed the reconstruction of this mountain road including four culverts and connection to the existing bridge abutment.

#### Project Manager

Various Locations | Massachusetts

*Various Roadway and Stormwater Improvement Projects.* Responsibilities for the following road rehabilitation and stormwater remediation projects included stormwater calculations, final design, and/or construction oversight:

- Provincetown:
  - 276 Bradford Street Improvements
  - Bradford Street Extension Drainage Improvements
  - Transfer Station Drainage Improvements
- Brewster, Tubman Road Drainage Improvements
- Orleans:
  - Wesquansett Road Improvements
  - Charles Moore Arena Drainage Improvements
  - Monument Road Drainage Improvements
  - Old County Road Drainage Improvements
  - Gibson Road Drainage Improvements (two sites)
  - Tonset Road Drainage Improvements (four sites)
  - Freeman Lane Drainage Improvements
  - Meadow Way Drainage Improvements
  - Rock Harbor Road Drainage Improvements
  - Locust Road Drainage Improvements
  - Overland Way Roadway and Drainage Improvements
  - Brick Hill Road Drainage Improvements (two sites)

- Town-wide Drainage Improvements (Finley Road, Pond Road, Pochet Road, Portanimiticut Road, and Cross Street)
- Sandwich, Old Colony Road Drainage Improvements

#### Nutrient Management Experience:

#### Project Manager

Town of Provincetown | Provincetown, Massachusetts

*Shank Painter Pond Study.* Project included the sampling and analysis of Shank Painter Pond. Project responsibilities included sampling, data review, and recommended mitigation efforts for the eutrophication problems that were occurring.

#### Project Engineer

Various Locations | Massachusetts

*Nutrient Management Plans.* Project engineer for various nutrient management plans to mitigate estuarine eutrophication in coastal embayments. Developed conceptual reports, and sewer and stormwater modeling for the communities of Barnstable, Chatham, Falmouth, and Mashpee.

#### Project Assistant

Monponsett Watershed Association | Halifax, Massachusetts

*Monponsett Ponds.* Assisted the Monponsett Watershed Association with grant writing assistance and strategy to develop remediation plans for the East and West basins on the Monponsett Pond system. Ultimately responsible for the writing and development of a grant under the Commonwealth's Sustainable Water Management Initiative (SWMI). The grant was awarded to the Town of Halifax for over \$75,000 for the development of an assessment of the basin and the unconnected watersheds. Also developed the application for the 2014 Massachusetts Department of Ecologic Restoration Priority Project Program which was awarded to the Town of Halifax in April of 2014.



## Constructed Wetland/Habitat Restoration Experience:

### Project Manager

Town of Halifax | Halifax, Massachusetts  
*Stump Brook Dam SCADA Assessment.* Project manager for the assessment of providing automated wireless controls at the existing sluice gates in the Stump Brook Dam. Project responsibilities include field visits, meetings with suppliers of automated controls, and report preparation along with multiple presentations in public forums at the Halifax and Brockton Town Halls. This project was funded through a Sustainable Water Management Initiative (SWMI) grant written and submitted by Mr. Kleekamp on behalf of the Town of Halifax.

### Project Manager

Town of Wareham | Wareham, Massachusetts  
*Red Brook Restoration.* Project manager for the field supervision of water sampling, water quality monitoring, soil boring oversight, and project coordination for the restoration of a 100+ acre cranberry bog and riverine restoration funded by the Massachusetts Department of Ecologic Restoration.

### Project Engineer

Town of Orleans | Orleans, Massachusetts  
*Constructed Wetland.* Project engineer responsibilities included the runoff calculations, site layout and design for a man-made wetland, or biofilter to remediate stormwater pollution. The biofilter was made up of a series of cascading pools to remove sediment before discharging to Town Cove. A detailed planting list was specified to ensure the biofilter would retain a natural appearance while removing sediment from the incoming stormwater.

### Project Manager

Town of Orleans | Orleans, Massachusetts  
*Constructed Wetland.* Project manager for the constructed wetland at the intersection of Tonset

Road and Freeman Lane. The project was developed to mitigate stormwater pollution prior to entering a nitrogen sensitive watershed. Project responsibilities included project development, oversight of design and permitting, attendance at Town and permit hearings and construction oversight.

### Project Engineer

Town of Bourne | Bourne, Massachusetts  
*Constructed Wetland.* Project engineer responsibilities included the runoff calculations, site layout, and design for a biofilter to remediate stormwater prior to entering Conservation Pond. The biofilter was the chosen stormwater best management practices in an area of high groundwater where subsurface leaching was not an option.

### Project Engineer

Town of Chatham | Chatham, Massachusetts  
*Parking Lot Reconstruction and Constructed Wetland.* The Town requested that a design be completed to show the reconfiguration of an existing parking lot to incorporate a man-made wetland in a low-lying area of the lot. Project responsibilities included site assessment and drafting of the proposed improvements for the parking lot.

## Wastewater Experience:

### Project Engineer

Town of Falmouth | Falmouth, Massachusetts  
*Recharge Beds 14 and 15.* Project engineer for the construction of 5 acres of new surface infiltration beds serving the Town of Falmouth Wastewater Treatment Facility. Project responsibilities included holding meetings, review of change orders, request for information, on-site project representation, and management of the overall construction schedule.



#### Project Manager

Town of Barnstable | Barnstable,  
Massachusetts

Project manager for the final design and construction management of the following wastewater projects funded through the SRF, CDAG, and ARRA:

- Bearses Way Force Main, \$1M CDAG Grant
- Stewarts Creek Water and Sewer Improvements, \$5.6M ARRA and SRF Funds
- Main Street Pump Station Relocation, \$4.6M ARRA and SRF Funds
- Route 132 Force Main and Widening Project, \$1.1M SRF Funds

#### Project Engineer

Town of Chatham | Chatham,  
Massachusetts

*Preliminary Town-wide Collection System Development.* Project engineer responsibilities included the modeling of over 100 miles of gravity and force mains as well as over 80 lift station sites. Several model conditions were evaluated for different flow conditions as well as development of complete system cost estimates for implementation in the Town's Capital Improvement Plan.

#### Project Engineer

Town of Falmouth | Falmouth,  
Massachusetts

*Wastewater Management Plan.* Project engineer for the plan preparation, focusing on the upgrade to the Town's existing wastewater treatment facility and collection system. Duties included the study of existing conditions, evaluation of existing collection system capacity, evaluation of alternative wastewater collection and treatment scenarios including the modeling and preliminary design (using SewerCAD) of over 30 miles of a gravity and pressure collection systems, and presentation of a recommended plan and environmental impact report.

#### Project Engineer

City of Newburyport | Newburyport,  
Massachusetts

*Pump Station Generator Replacement.*

Responsibilities included the review of existing data, and preparation of final design plans and specifications to replace or add new standby generators for 7 sewer pump stations within the City. Numerous stations required removal of UST's and installation new AST's.

#### Project Engineer

Town of Mashpee | Mashpee,  
Massachusetts

*Wastewater Facilities Plan.* Project engineer for the plan which focused on over 60 miles of gravity/force main collection system modeling using SewerCAD. Duties also included evaluations of several smaller "package plants" and determining if these plants has capacity for future collection system tie-ins.

#### Project Engineer

Town of Chatham | Chatham,  
Massachusetts

*Sewer Capacity Modeling.* Project engineer responsibilities were to prepare a SewerCAD model of the Town's existing collection system, approximately 5 miles of gravity sewer mains, to use in future wastewater planning.

#### Project Engineer

Town of Barnstable | Barnstable,  
Massachusetts

*Downtown Sewer Model Analysis.* Project engineer for completing a SewerCAD model of the downtown Hyannis wastewater collection system. This model was used to determine "bottlenecks" in the collection system, needed improvements, and cost estimates of improvements.

#### Project Engineer

Town of Plymouth | Plymouth,  
Massachusetts

*Cordage Park Sewer Capacity Analysis.* This project focused on the conditions of an existing sewer infrastructure in an area of the planned development of condominiums and other





commercial/residential development resulting in an additional expected wastewater flow of 250,000 gallons per day. Responsibilities included an infiltration/inflow investigation of the existing system using flow recordings over a 2-week period as well as a capacity analysis of the existing sewer mains and two lift stations.

**Project Engineer**

Town of Oak Bluffs | Oak Bluffs,  
Massachusetts

*Pump Station Generator Installation.* This project included the construction and installation of a new 250 kW generator for the Town's largest sewer pump station. Responsibilities included various construction inspections of activities such as re-bar placement, concrete placement, and generator installation. Held project meetings, reviewed shop drawings and developed record drawings of completed projects.

**Project Engineer**

Town of Plymouth | Plymouth,  
Massachusetts

*Sewer Extension Feasibility Study.* Study included the preliminary layout of a proposed gravity system to an existing system and the capacity analysis of the existing system for the new main. The capacity analysis included over 5 miles of the existing gravity collection system and a major pump station.

**Project Engineer**

Town of Barnstable | Barnstable,  
Massachusetts

*High School Sewer Improvement.* Responsibilities included the review of existing data, and preparation of final design plans and specifications to elevate a settled sewer manhole on the Barnstable High School property.

**Project Engineer**

Town of Westport | Westport,  
Connecticut

*Pump Station and Force Main Installation.* Responsibilities included the drafting and design of a new pump station; several bypass connections; and routing of the new force main.

**Resident Project Representative**

Town of Darien | Darien, Connecticut

*Force Main Installation.* Project duties were to ensure the force main was installed in accordance with the design plans and specifications.

**Project Engineer**

Town of Falmouth | Falmouth,  
Massachusetts

*On-Call Services.* Responsibilities include remediation of non-functioning sewer valves, existing treatment plant modifications, and pump station design and layout.

**Resident Project Representative**

Town of Barnstable | Barnstable,  
Massachusetts

*Treatment Facility Installation at Horace Mann Charter School.* Duties included ensuring the new treatment components, including several hundred feet of gravity sewer were installed in accordance with the design plans and specifications.

**Project Engineer**

Town of Wareham | Wareham,  
Massachusetts

*Grant Writing.* Project engineer in charge of developing grant application for nutrient reduction to the Buzzards Bay Watershed. Proposed project include the installation of various water quality meters at specific locations throughout the treatment process to better evaluate process parameters such as dissolved oxygen, nitrogen, and pH. Monitoring allowed the facility to be proactive to process fluctuations and attain better nitrogen reduction.

**Water Experience:**

**Project Manager**

Town of Provincetown | Provincetown,  
Massachusetts

*Commercial Street Water Main Replacement.* Project responsibilities included managing the design for the removal of a 12" asbestos cement water main, development of asbestos handling documents in conjunction with MassDEP



regulations, public participation and outreach, cost estimating and bidding oversight.

Project Manager

Town of Barnstable | Barnstable,  
Massachusetts

*Stewarts Creek Water and Sewer Improvements.* Project included the construction management of a 125 gpm pump station and over 12,000 linear feet of new sewer main, over 10,000 linear feet of new water main, and full width overlay on several roads. Construction responsibilities included coordination with off-site testing agencies, public notification, response to field orders, change orders and request for information, management of up to 7 construction crews at various project locations, and running bi-weekly progress meetings. Additional responsibilities included preparation for MassDEP and EPA audits as this project was funded through the ARRA. Audits required all project correspondence including wage rates, weekly payrolls, product shop drawings and field reports to be in conformance with the contract documents.

Project Manager

Town of Barnstable | Barnstable,  
Massachusetts

*Downtown Water Main Improvements.* Project included the construction management of the installation of approximately 10,000 linear feet of new ductile iron water main. Construction responsibilities included public notification, response to field orders, change orders and request for information and running bi-weekly progress meetings. Additional responsibilities included coordination with MassDOT for the directional drilling of pipeline underneath Route 28 preparation for MassDEP and EPA audits as this project was funded through the ARRA. Audits required all project correspondence including wage rates, weekly payrolls, product shop drawings and field reports to be in conformance with the contract documents.

Project Manager

Cape Cod Community College | West  
Barnstable, Massachusetts

*Water Boosting Pump Station Assessment.* At the time of this assignment, the College had failing water boosting pump station and they retained GSE to identify malfunctioning mechanical components and develop project cost estimates. Responsibilities included identification of malfunctioning mechanical infrastructure, coordination with pump suppliers, development of cost estimates and meeting attendance with the Client.

Project Manager

Village of Cotuit | Barnstable,  
Massachusetts

*Elevated 500,000 Gallon Water Storage Tank.* Responsible for the design, bidding, and construction administration of an elevated 500,000 gallon water storage tank, site improvements and 1,000 linear feet of new water main. Project responsibilities during construction included coordination with concrete and geotechnical testing agencies, structural re-bar inspection of the foundation, development of field reports and attendance at progress meetings.

Project Manager

Village of Cotuit | Barnstable,  
Massachusetts

*On-Call Services.* Project manager for on-call services with the Cotuit Water Department for a variety of engineering related assignments included assistance with the implementation of a fiber optic security and surveillance system, assistance with development of future water system modifications and planning of elevated water tank demolition and new construction.

Project Manager

Village of Cotuit | Barnstable,  
Massachusetts

*Elevated 300,000 Gallon Water Storage Tank.* Responsible for the design, bidding and construction administration of an elevated 300,000 gallon water storage tank, site improvements and demolition of two existing 200,000 gallon elevated tanks. Responsibilities included oversight of plan



development, water modeling, specification development, public meetings and project scheduling.

#### Project Manager

Town of Chesapeake Beach |

Chesapeake Beach, Maryland

*Elevated 400,000 Gallon Water Storage Tank.*

Project manager responsible for the design of a 400,000 gallon elevated water storage tank.

Project responsibilities included tank sizing, interior chemical feed pump selection, water treatment options and design on a nearby supply well.

#### Resident On-Site Engineer

Various Locations | Massachusetts

*Construction Oversight.* Resident on-site engineer for the construction oversight of the installation of new water mains. These project sites included the replacement of asbestos cement water mains.

Project responsibilities included oversight of construction installation in conformance with the contract documents, development of record drawings, developing daily field reports and coordination with the Owner.

#### Building/Structural Experience:

##### Project Manager

Village of Cotuit | Barnstable,

Massachusetts

*Development of Wireless Communication Facility*

*RFP.* Project manager for the development of a new wireless communication facility (cell phone tower). Project responsibilities included development of the language and text for a request for proposal (RFP), public meetings, meeting with local and county regulators, meeting with legal counsel, and meeting with wireless carriers.

##### Program Manager

Charlestown Navy Yard | Charlestown,  
Massachusetts

*Steam Bending Shed Renovation.* Rehabilitation of the steam bending shed. The steam bending shed is on the historic register as the building used to steam and form the wood used for

structural repairs on the USS Constitution, or "Old Ironsides". Mr. Kleekamp managed the removal of lead and asbestos, structural repairs and installation of new roofing, siding, windows, doors and internal components.

##### Program Manager

Portsmouth Naval Yard | Kittery, Maine

*B298 Access Platforms.* Program manager for the design, fabrication and installation of maintenance access platforms for the dust collector unit at Building 298 at the Portsmouth Naval Shipyard, Kittery, ME. These access platforms were used to provide platforms for personnel to maintainance the equipment at Building 298.

#### Site/Civil Experience:

##### Project Manager

Town of Middleborough | Middleborough,  
Massachusetts

*Shore Stabilization.* Design, permitting, and construction of a residential shore stabilization project at 35 Lakeside Road, Middleborough, Massachusetts. Project included the clearing, grubbing, preparation and placement of stone to protect against the erosion from the waters of Assawompset Pond, one of the largest naturally occurring ponds in Massachusetts.

##### Project Manager

Calvary Church | Hyannis,

Massachusetts

*Site Design.* Project involved civil site design including grading and utilities for the Calvary Church. The church had suffered extensive damage from a fire and was torn down and rebuilt. Mr. Kleekamp was the responsible for the design, development, permitting and site plan review for the new church.

##### Project Engineer

Town of Barnstable | Barnstable,  
Massachusetts

*Project Permitting.* Developing, filing and attending permit hearings for multiple projects including the Snow's Creek Culvert Replacement and the Bumps River Bridge Rehabilitation. Responsibilities included researching applicable



permits such as NOI, MESA ENF, Chapter 91 License, Historic District, MassDOT, and others.

**Project Engineer**

Town of Southbridge | Southbridge, Massachusetts

*Project Permitting.* Stormwater design, project permitting, and construction permitting for a privately owned solid waste recycling facility. Site covered multiple acres and required substantial site drainage to allow discharge to an inland resource area.

**Project Manager**

Cape Cod Regional Transit Authority | Dennis, Massachusetts

*Parking Lot Design.* Redesign of the existing CCRTA parking facility. Project responsibilities included developing plans to expand the existing 65 space lot without major lot modifications, simply through re-design traffic flow and parking patterns.

**Project Manager**

Town of Wareham | Wareham, Massachusetts

*Dam Removal.* Working under funding provided by the Buzzards Bay Coalition, Mr. Kleekamp managed the survey of the Weweantic and Horseshoe Pond Dam site. Survey included 16 river cross sections, detailed site survey of the dam site and 6,000 linear feet of stream profile.

**Project Manager**

Town of Pittsfield | Pittsfield, Massachusetts

*Dam Removal.* Working under funding provided by the Massachusetts Division of Ecologic Restoration, Mr. Kleekamp managed the survey of the Tel-Electric Dam site. Survey included 40 river cross sections, detailed site survey of the dam site, and 9,000 linear feet of stream profile.

**Solid Waste Experience:**

**Construction manager**

Town of Orleans | Orleans, Massachusetts

*Municipal Landfill Closure.* Construction manager for the closure of the Orleans Municipal Landfill and construction of the new transfer station. Project included the closure and capping of an 18-acre site with an active gas transport system, landfill flare and new transfer and weight station. Project responsibilities included oversight of the full time resident engineer, response to field orders, review of change orders, attendance at bi-weekly progress meetings, presentations to the Board of Selectmen, and frequent site visits.

**Construction Manager**

Town of Chilmark | Chilmark, Massachusetts

*Municipal Landfill Closure.* Construction manager for the closure of the Chilmark Municipal Landfill. Project included the closure and capping of an 11-acre site with a passive gas system. Project responsibilities included oversight of the full time resident engineer, response to field orders, review of change orders, attendance at bi-weekly progress meetings, water, soil and air sampling, and frequent site visits.

**Project Manager**

Town of Wareham | Wareham, Massachusetts

*Catch Basin Cleaning.* Project manager for the guidance and disposal of catch basin cleaning and street sweepings. Project responsibilities included research with local landfills for receiving, material sampling, and disposal recommendations.

**Project Engineer**

Various Locations | Massachusetts

Project engineer for the towns of Barnstable, Harwich, and Provincetown responsible for the development of Beneficial Use Determination (BUD) application as required by MassDEP for the reuse of catch basin cleanings and similar materials at landfills, use as berms and other uses.



Construction Management and Resident  
Inspector Experience:

Project Manager

Town of Barnstable | Barnstable,  
Massachusetts

*Main Street Pump Station Relocation.* Project included the construction management of a 3 mgd pump station and over 18,000 linear feet of force main. Construction responsibilities included development of traffic management plans, coordination with off-site testing agencies, public notification, management during night work, response to field orders, changer orders and request for information, oversight of multiple construction crews, and running bi-weekly progress meetings. Additional responsibilities included preparation for MassDEP and EPA audits as this project was funded through the ARRA. Audits required all project correspondence including wage rates, weekly payrolls, product shop drawings and field reports to be in conformance with the contract documents.

Project Manager

Town of Barnstable | Barnstable,  
Massachusetts

*Bearses Way Force Main.* Project included the final design and construction of the rehabilitation of an existing pump station retrofit with larger pumps and over 9,000 of dual force main, sizes 8- and 14-inch. This project was funded through a CDAG grant and project responsibilities included on-site representation, response to requests for information, documentation and preparation of record drawings, traffic management coordination, budget review and preparation and attendance at progress meetings.

Project Manager

Town of Orleans | Orleans,  
Massachusetts

*Council on Aging Landscape Plan.* Project and construction manager. Project included the installation of textured pavement, artistic layout of walking trails, exercise stations, gardens, planters and drainage structures.





## Presentations and Publications

- "Monponsett Ponds Restoration Efforts," joint presentation by GHD, Massachusetts Division of Ecologic Restoration and the United States Environmental Protection Agency, presented at the Silver Lake Regional High School, Pembroke, MA, September 2015. Mr. Kleekamp's presentation focused on the feasibility of installing automated controls at the Stump Brook Dam.
- "Provincetown Stormwater Program Revitalizes Downtown and Improves Water Quality," NEWEA Journal Summer 2015, Volume 49, Number 2 (with Sandra Tripp and Jessica Janney of GHD, Richard Waldo of the Town of Provincetown, and Robert Roseen of Horsley Witten Group).
- "Sanitary Sewer Modeling for Cape Cod Municipalities," presented at the MALSCE Convention, Eastham, MA, October 2007.
- "Stormwater Mitigation – Bass River Watershed and Provincetown Harbor," presented at the NEWEA/ NYWEA Conference, Hyannis, MA, June 2008.
- "Beneficial Reuse of Catch Basin Cleanings and Street Sweepings," published in the American Public Works Association, September 2006.
- "Stormwater Management and Permitting," presented at the Monponsett Watershed Association, May, 2012.
- "Innovative Porous Technologies" presented at the Society of American Military Engineers Piscatiqua Post, Hampton NH, November 2013.
- "Grants" presented at the Barnstable County Public Works Association meeting, February 2014 and also the Plymouth County Public Works Association meeting in April 2014.
- "Nitrogen Removal at the Wareham WPCF", presented at the New Bedford Whaling Museum as part of the "River Meets the Sea" workshops sponsored by the Buzzards Bay Coalition in April 2015.

## Military Experience

- Corporal, United States Marine Corps, 1996 – 2004, Heavy Machine Gunner



## Jessica P. Janney Engineer



Qualified. M.S. (2005), Civil & Environmental Engineering, Tufts University  
B.S. (1999), Resource Economics, University of Massachusetts at Amherst  
Connected. New England Water Environment Association  
Water Environment Federation; American Public Works Association; Barnstable  
County Public Works Association

Relevance to project. Ms. Janney has 15 years' experience in the field of  
engineering, focusing in the areas of infrastructure, stormwater improvements,  
grant development, permitting, environmental assessments, planning and  
remediation

### Project Manager

Town of Provincetown | Provincetown,  
Massachusetts

*Commercial Street Improvements Projects –  
Phases I through III.* Project included design and  
construction phase services for nearly 7,000 feet  
of road improvements using porous pavement to  
improve stormwater management along  
Provincetown's busiest street. Responsibilities  
include specification development, overall project  
management and securing grant funding for all  
phases.

### Project Manager

Town of Falmouth | Falmouth,  
Massachusetts

*Bournes Pond Inlet Widening.* Project includes  
permitting and design of inlet widening to improve  
flushing in Bournes Pond for nitrogen  
management. Project includes jetty reconstruction,  
dredging, beach nourishment and bridge redesign  
on Menauhant Beach and Road. Responsibilities  
include permit development and review, design  
coordination and overall project management.

### Project Manager

Town of Orleans | Orleans,  
Massachusetts

*Skaket Beach Parking Lot Improvements.* Design,  
permitting and construction of stormwater  
improvements to remediate a beach outfall and  
new septic system installation. Responsibilities  
included overall project management, specification

development, and permitting for stormwater  
components.

### Project Manager

Town of Eastham | Eastham,  
Massachusetts

*Great Pond and Herring Pond Phosphorus  
Inactivation Projects.* Responsibilities included  
permitting, coordinating the study, sampling, and  
application of alum to phosphorus-impacted ponds  
to improve water quality in two of Eastham's highly  
used ponds.

### Project Manager

Town of Falmouth | Falmouth,  
Massachusetts

*Acapesket Peninsula Groundwater Investigation  
Studies – Phases I and II.* Project objective  
included collection of information to assess  
groundwater conditions related to nitrate in the  
vicinity of Lewis Neck and evaluate the efficacy of  
a Permeable Reactive Barrier (PRB) as mitigation  
to Great Pond. Responsibilities included overall  
project management and report review.

### Project Manager

Town of Eastham | Eastham,  
Massachusetts

*Wastewater Planning.* Responsibilities included  
developing wastewater flow calculations from  
existing water consumption data, researching  
potential sites for wastewater recharge and  
alternatives screening analysis in addition to



updating the Town's plan with use of the Cape Cod Commission's 208 Planning Tools, public outreach and completion of Watershed Reports.

Project Engineer

Town of Falmouth | Falmouth,  
Massachusetts

*Little Pond Sewer Service Area and Recharge Beds 14 & 15.* Responsibilities included permitting for this important service area to collect wastewater, treat it at the existing Town Wastewater Treatment Facility, and recharge in new sand beds in an effort to improve the impacted water quality of Little Pond.

Project Engineer

Town of Barnstable | Barnstable,  
Massachusetts

*Comprehensive Wastewater and Nutrient Management Plan and Wastewater Facilities Plan.* Responsibilities included needs assessment development specifically related to the existing and future conditions in the Town.

Project Engineer

Town of Falmouth | Falmouth,  
Massachusetts

*Comprehensive Wastewater Management Plan Process and Document Development.* Responsibilities included interpreting and integrating the Massachusetts Estuaries project data and geographic information system derived water and land use data from watersheds to determine existing and future wastewater flow and nitrogen loading data for the planning areas.

Project Engineer

Town of Brewster | Brewster  
Massachusetts

*Stormwater Improvements at Paines Creek Beach, Saint's Landing, Stony Brook Road Mill Site and Tubman Road.* Responsibilities included securing grant funding and permits.

Project Engineer

Town of Orleans | Orleans,  
Massachusetts

*Stormwater and Roadway Improvements on Route 39; Stormwater Improvements at Pochet Road, Monument Road, Fox Ridge Drive, Town Cove, Gibson Road, Meadow Way, Skaket Beach Road, Rock Harbor Road, and at several public landings.* Responsibilities included developing specification manuals and construction phase services and securing grant funding where feasible.

Project Engineer

Town of Provincetown | Provincetown,  
Massachusetts

*Construction of Stormwater Improvements for the West End Parking Lot, Court Street Landing, and a portion of Bradford Street.* Responsibilities included permitting, developing specification manuals and bid documents, reviewing submitted bids and shop drawings, project oversight and conducting final inspections.

Project Engineer

Town of Barnstable | Barnstable,  
Massachusetts

*Main Street Pump Station Relocation Project, Area H-1 East and West Sewer and Water Improvements Projects, and the Downtown Water Main Improvements Project.* Construction phase services for multiple infrastructure improvement projects funded by ARRA and the SRF program.

Project Engineer

United States Environmental Protection  
Agency Region 8 | Libby, Montana  
*Libby Asbestos Superfund Project.* Assisted with the management of the remediation efforts through the USDOT/RITA/Volpe National Transportation Systems Center in Cambridge, Massachusetts.



#### Project Engineer

##### Environmental Assessments

Developing environmental assessments including the Assessment of Stormwater Drainage and Pollutants in Paines Creek and Stony Brook Watershed for the Town of Brewster, Massachusetts, and the Great Sand Lakes Guidance Document and Case Study for the Town of Harwich, Massachusetts.

##### Permitting

Experience with developing, filing and securing permits including RDAs/NOIs, Chapter 91 Licenses, Massachusetts Historical Commission and Natural Heritage and Endangered Species Program Reviews, MEPA NPC, EIR/FEIR, and MassDOT Access Permits.

#### Grant Development

Successful grant experience with State Revolving Fund (SRF) and American Recovery and Reinvestment Act (ARRA), Section 319 and 604(b) grant funding for water quality design and improvements projects, USDA NRCS grants for water resource restoration projects, MassWorks Infrastructure Program (Public Works Economic Development Grant) for road reconstruction using porous asphalt, and Coastal Zone Management coastal pollution and non-point remediation funding for various Towns on Cape Cod.

#### Awards

- Citation from the United States Department of Justice for work on the Libby, MT CERCLA (Superfund) cost recovery efforts, 2003 in the case United States vs. W.R. Grace & Co.

#### Publications and Presentations

- "Integrated Approach to Nutrient Management, Town of Eastham, MA," NEWEA Annual Conference & Exhibit, January 2016 (with Anastasia Rudenko of GHD and Jane Crowley of the Town of Eastham).
- "How Provincetown, MA Used Porous Pavement To Reduce Beach Closures Caused by Stormwater Discharges," Water Environment Federation's Annual Technical Exhibition and Conference (WEFTEC), September 2015 (with M.R. Drainville, S.L. Tripp, R.M. Roseen, R.J. Waldo).
- "Provincetown Stormwater Program Revitalizes Downtown and Improves Water Quality," NEWEA Journal Summer 2015, Volume 49, Number 2 (with Sandra Tripp and Russell Kleekamp of GHD, Richard Waldo of the Town of Provincetown, and Robert Roseen of Horsley Witten Group).
- "Reconstructing Commercial Street with Porous Pavement to Mitigate Stormwater Discharges and Improve Water Quality in Provincetown Harbor," NEWEA Watershed Management and Stormwater Conference and Exhibit, October 2014 (with Sandra Tripp of GHD).
- "Provincetown Porous Asphalt Keeps Beaches Open," NAPA September/October 2014, Volume 19, No. 5 (with Robert Roseen of Geosyntec Consultants, Richard Waldo of the Town of Provincetown, and Sandra Tripp of GHD).
- "Reconstructing Commercial Street in Provincetown with Porous Pavement to Mitigate Stormwater Discharges and Repair the Roads After Sewer Installation," NEWEA Spring Meeting and Exhibit, June 2013 (with Nathan Weeks of GHD).

## **Attachment 5**

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- **Western Basin of Monponsett Pond, Halifax and Hanson, MA, 2015  
Year-End Alum Treatment Report**



# Western Basin of Monponsett Pond

Halifax and Hanson, Massachusetts

2015 Year-End Alum Treatment Report

Prepared for:  
Town of Halifax  
499 Plymouth Street  
Halifax, MA 02338

Prepared by:  
Aquatic Control Technology  
590 Lake Street  
Shrewsbury, MA 01545

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## Appendices

### *Appendix A*

'REVISED Habitat Management Plan for Phosphorus Inactivation in the Western Basin of Monponsett Pond'  
(Aquatic Control Technology, 2015)

### *Appendix B*

Treatment Monitoring Program at the West Basin of Monponsett Pond Raw Data (Table 1-4)

## I. INTRODUCTION

Aquatic Control Technology (ACT) was contracted by the Town of Halifax to conduct a Habitat Management Plan for Phosphorus Inactivation in the Western Basin of Monponsett Pond. In accordance with this contract, the following document serves as a year-end report to summarize the tasks completed in the 2015 management season.

## II. PERMITTING

*U.S. Environmental Protection Agency National Pollution Discharge Elimination System Permit*

Lycott Environmental filed an electronic Notice of Intent (eNOI) under the U.S. Environmental Protection Agency Pesticide General Permit (PGP) for the application of pesticides to the Monponsett Ponds on behalf of the Town of Halifax on May 9, 2012. This application was signed and submitted by the Town of Halifax on May 19, 2013, which then received an active status ten days following its submission. The NOI remains valid until May of 2018.



**Image 1.** 2015 Treatment Zones of the Western Basin of Monponsett Pond

*Massachusetts Endangered Species Act Project Review*

A 'REVISED Habitat Management Plan for Phosphorus Inactivation in the Western Basin of Monponsett Pond' was submitted to the Massachusetts Division of Fisheries and Wildlife (DF&W) Natural Heritage and Endangered Species Review Program (NHESP) on March 31, 2015. The NHESP provided approval correspondence on May 14, 2015.

*Order of Conditions*

The Orders of Conditions (Halifax & Hanson) have been automatically extended by the Permit Extension Act and are therefore valid for an additional four years from the original date of expiration or until 2019.

*Massachusetts Department of Environmental Protection License to Apply Chemicals*

ACT prepared and filed for the required License to Apply Chemicals permit from MA DEP Office of Watershed Management; the approved license was issued on May 13, 2015 (#15139).

## III. 2015 TREATMENT PROGRAM CHRONOLOGY

The tasks performed as part of the 2015 treatment program are outlined below.

- |   |           |
|---|-----------|
| ➤ Received approved MA DEP License to Apply Chemicals | 5/13/2015 |
| ➤ Received management plan approval from NHESP        | 5/14/2015 |
| ➤ Alum treatment #1                                   | 6/02/2015 |
| ➤ Alum treatment #2                                   | 6/30/2015 |
| ➤ Alum treatment #3                                   | 7/23/2015 |

\*Note: Pre-treatment, 1- and 3-day post-treatment surveys and sampling were conducted after each treatment. Further, 7-day post-treatment surveys and sampling were only done after treatment #1 & 2.

## IV. TREATMENT LOGISTICS

A total of three (3) buffered, low-dose alum applications were administered during the 2015 management season: June 2<sup>nd</sup>, June 30<sup>th</sup> and July 23<sup>rd</sup>. During each treatment event, one specially equipped treatment vessel was used to apply 3,000 gallons of aluminum sulfate and 1,500 gallons of sodium aluminate to areas greater than 4' in depth in the West Basin of Monponsett Pond, an area totaling 235 acres. The 235 acre treatment area

was further divided into three smaller pre-determined treatment zones ('Image 1') with relatively similar depth characteristics in order to ensure accurate dosing and a more uniform application of the alum and sodium aluminate. These smaller treatment zones were then treated evenly with an approximate 0.7 ppm of Al.

## V. MONITORING PROGRAM

The following table outlines the major components of the monitoring program and their respective goals, as approved in the habitat management plan ('Appendix A').

**Table 1.** Monitoring program design

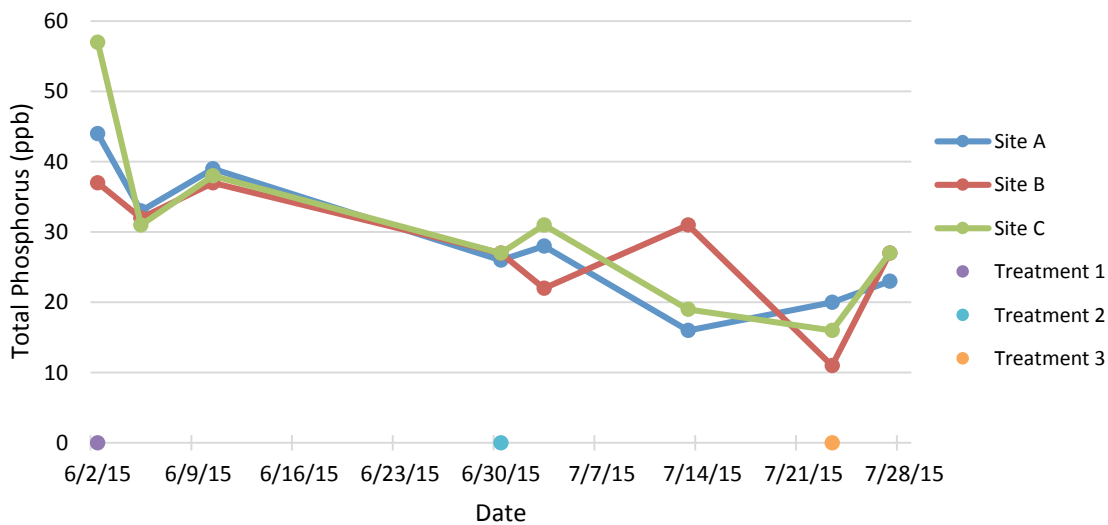
Monitoring component	Timing in relation to treatment	Location(s)	Goals
<b>Water Quality</b>	Before, during and after each application	1 established location within each treatment zone	Evaluate short and long-term effects on water quality
<b>Measurement of flocculation</b>	During	1 visual recording; 6 measurement locations	Assess the amount of floc accumulated on the sediment
<b>Monitoring of state-listed species</b>	Before, during and after one and five years following	5 paired plots	Evaluate short and long-term effects on these species identified by NHESP as potentially susceptible to the treatment

### a. WATER QUALITY MONITORING

Baseline, required water quality parameters (i.e., pH, total and dissolved phosphorus, alkalinity and turbidity) were gathered at a pre-determined location within each treatment area. These data were collected during pre-treatment and 1- and 3-day post-treatment sampling efforts for each treatment event. Also, these data were collected during 7-day post-treatment sampling efforts, however, for the first and second treatment events only ('Appendix B, Table 1'). Additional *in situ* water quality parameters (i.e., temperature, dissolved oxygen and water clarity [via Secchi disk]) were collected at the same locations at 1- and 3-day post-treatment sampling efforts for each treatment ('Appendix B, Table 2').

#### *Total Phosphorus Monitoring*

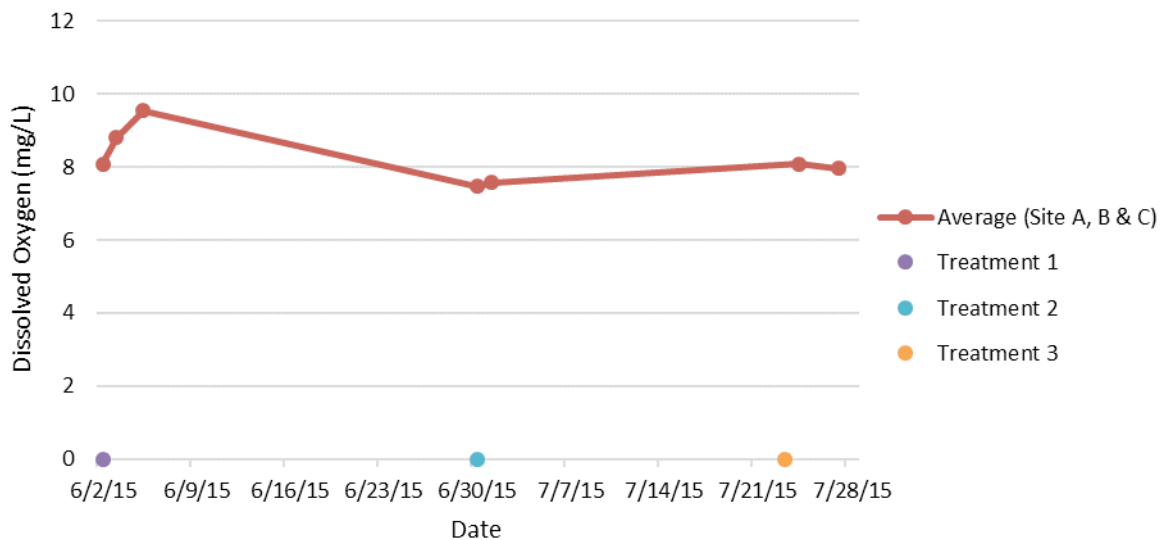
A total phosphorus measurement was collected per treatment area per sampling event over the 2015 management season, for a total of 24 measurements overall. Phosphorus levels overall decreased following the first and second treatment events, with the exception of a temporary increase at Site B until the third pre-treatment sampling. Following the third treatment, phosphorus levels at all three sites rebounded to levels similar to that prior to the second treatment ('Figure 1'). Overall the results show a reduction in total phosphorus of nearly 50% (46 ppb June – 26 ppb July) during the course of the season.



**Figure 1.** Comparison of total phosphorus (ppb) during pre- and post-treatment sampling within each treatment zone in the West Basin of Monponsett Pond, (June 2 to July 27, 2015).

#### *Dissolved Oxygen Monitoring*

A dissolved oxygen measurement was collected *in situ* per treatment area per sampling event throughout the season, totaling 73 measurements. Despite observed fish mortality at the time of the first buffered alum treatment, early morning and daytime dissolved oxygen levels recorded were sufficient to support a variety of fish species. A slight increase in dissolved oxygen was observed following the first treatment event; however, levels later decreased and remained stable ('**Figure 2**'). The dissolved oxygen measurements suggest that levels remained within desirable ranges (> 5 mg/l) for fish and wildlife populations throughout the course of the program and were not significantly impacted by the buffered alum treatments.

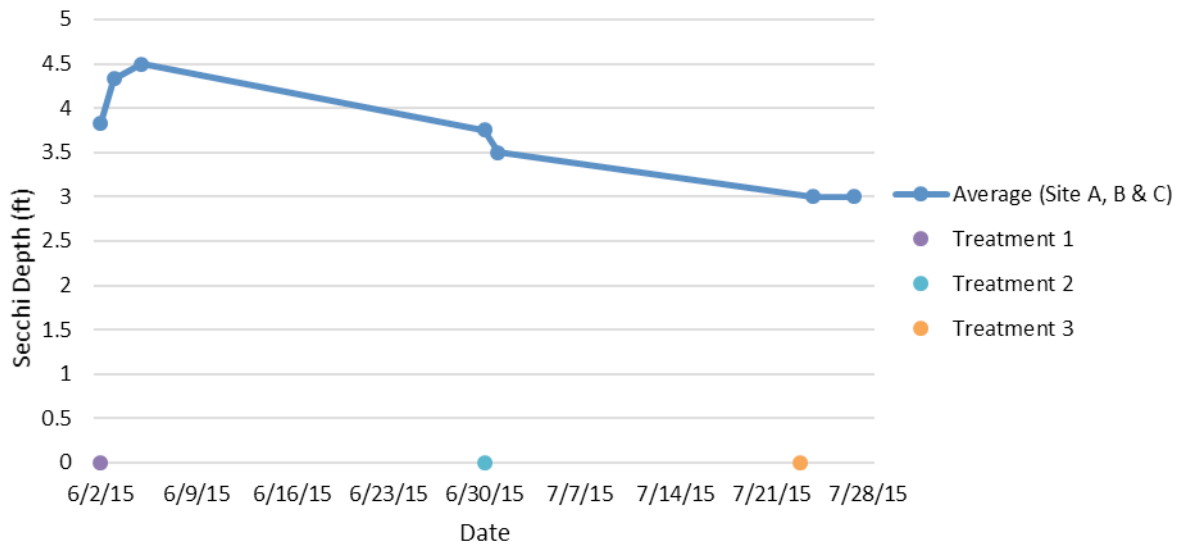


**Figure 2.** Average dissolved oxygen (mg/L) sampling results of all three treatment zones, (June 2 to July 27, 2015).



#### Water Clarity Monitoring (via Secchi Disk)

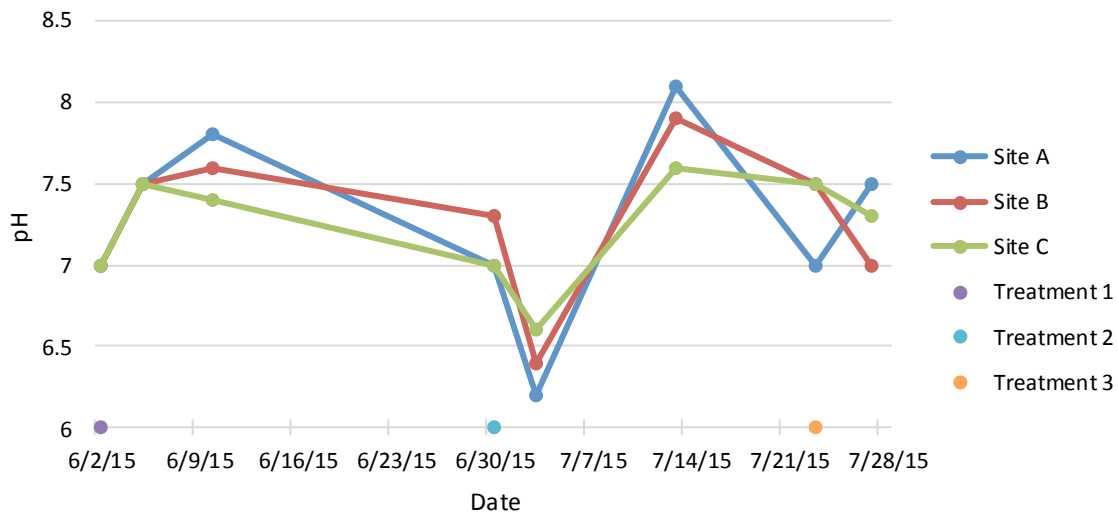
Water clarity was measured five (5) times per treatment zone, with the exception of Site C, which was measured an additional two (2) times, throughout the season. After the first treatment event, there was an increase in Secchi depth, which correlates to better water clarity. However, the depth decreased slightly throughout the remainder of the management season ('Figure 3'). Despite fairly consistent algal abundance recorded during our sampling, the Secchi depth measurements along with visual observations suggest a reduction in clarity due to increasing algal cell density.



**Figure 3.** Average Secchi Disk depth (ft.) results of all three treatment zones during pre- and post-treatment sampling, (June 2 to July 27, 2015).

#### pH Monitoring

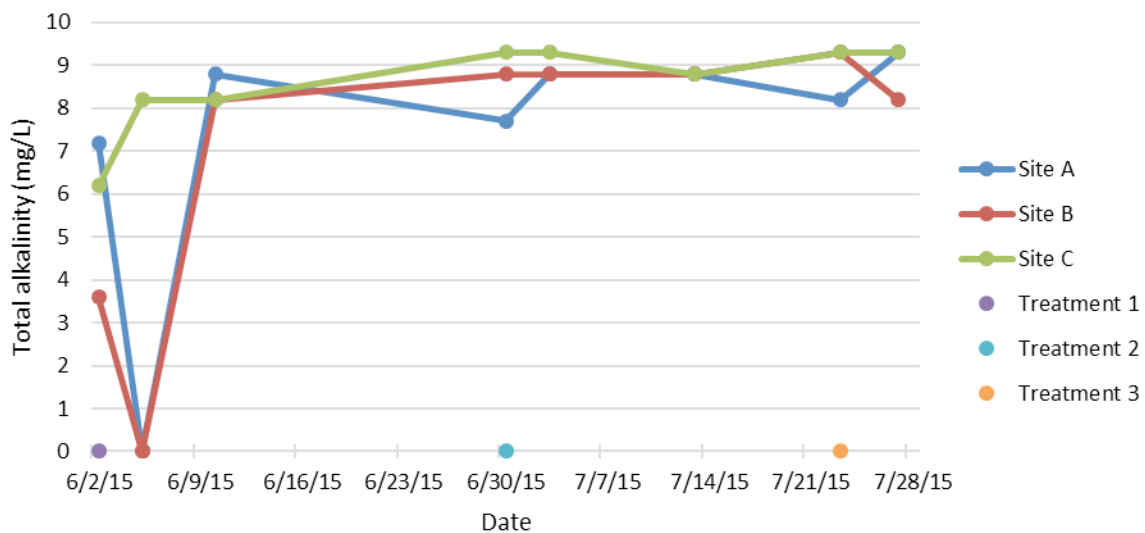
A pH measurement was collected per treatment area per sampling event over the 2015 management season, for a total of 24 measurements overall. pH levels remained fairly steady for the first and third treatment events and their post-treatment measurements. However, following the second treatment, there was a decrease and then sharp increase in pH levels, from approximately 6 to 8 ('Figure 4'). Overall the results show relatively constant pH levels throughout the management period. Although there was a significant pH drop immediately following the second buffered alum treatment, *in-situ* measurements performed during the course of the treatment indicated minimal pH fluctuations (7.25-6.75 SU) in response to the aluminum sulfate and sodium aluminate application. Despite the decline values remained within the range of 6.0-7.5 SU that is desirable for the aluminum - phosphorus reaction.



**Figure 4.** Comparison of pH during pre- and post-treatment sampling within each treatment zone (June 2 to July 27, 2015).

#### Total Alkalinity Monitoring

Total alkalinity was measured per treatment area per sampling event, for a total of 24 measurements overall during the 2015 management season. The total alkalinity measurements remained steadily between approximately 7 and 9 mg/L throughout the sampling program, with the exception of two non-detect measurements on June 5, 2015 at Site A and B ('Figure 5').



**Figure 5.** Comparison of total alkalinity (mg/L) measurements during pre- and post-treatment sampling within each treatment zone (June 2 to July 27, 2015).

#### b. ALGAE SAMPLING

A single monthly sample (April-September) was collected from Area B within the West Basin for algae species identification and evaluation of general species abundance/dominance. Based on the results of these samples the algae assemblage remained fairly uniform during the 2015 season. All samples indicated a blue-green dominant assemblage with high numbers of the filamentous blue-greens, *Planktolyngbya* and *Aphanizomenon*

present in both early and late season samples. The unicellular colonial blue-green *Microcystis* was also prevalent in all of the samples, but was generally less abundant than the filamentous blue-greens. Other background species consisted of predominantly diatoms (*Aulacoseira* and *Tabellaria*) and green species (*Akistrodesmus*, *Elakothrix*, and *Scenedesmus*) that appeared to increase in density during the course of the growing season. Although blue-green species dominated all of the samples the overall algae abundance increased during the course of the season.

#### **c. IN SITU MEASUREMENT OF FLOCCULATION**

Prior to treatment, five floc-collection devices were installed and situated in close proximity to the *in situ* mussel monitoring stations. The devices were installed from the surface (rather than in-water) due to unsafe cyanobacteria levels. Although the devices were weighted to remain upright during the at-surface installation, upon retrieval, complications such as partial lid closure and small losses in sample were noted. This likely offers an explanation for the decreased floc accumulation during the third treatment event. Average floc accumulation was less than 0.15 inches for each treatment event ('Appendix B, Table 3'). Overall floc measurement data from 2014 and 2015 suggest there is minimal floc accumulation associated with these lower dose treatments.

#### **d. MUSSEL MONITORING**

Although originally proposed in the habitat management plan, short-term mussel monitoring did not occur during the initial treatment event due to reduced water clarity and an ongoing fish kill. The monitoring occurred during the third treatment event; however, due to high cyanobacteria levels reported by the Town of Halifax's Board of Health (>70,000 cells/mL), in-water observations were replaced with at-surface observations. This methodology had complications, which led to collecting broader observations of mussels present (i.e., approximate density of live and recently spent mussels, and mussel behavior) at the monitoring stations utilized in 2013. Observations were done at 1 and 4 days following the third treatment ('Appendix B, Table 4'). Due to complications during mussel observation, conclusions on the short-term impacts on the state-listed mussels were difficult to draw; however, based on past monitoring at West Monponsett Pond and mussel monitoring conducted following other buffered alum treatments, the short-term impacts to state listed mussels appears to be minimal.

### **VI. DISCUSSION/CONCLUSION**

Although West Monponsett Pond experienced periods of cyanobacteria growth with cell densities above the MA DPH threshold (70,000 cells/ml) in 2015, we feel based on the Secchi depths in late July and the incremental reduction of total phosphorus observed that the treatment program provided both short and long-term improvements. Despite a near 50% reduction in total phosphorus (TP) levels and an average TP concentration below 20 ppb in late July cyanobacteria densities continued to rise in late summer. Therefore, in an effort to better bind up available phosphorus and further reduce seasonal algae production we are proposing the following program modifications for 2016.

- Sampling results indicate that phosphorus levels were at their highest during the early season (6/2/15 mean TP – 46 ppb) and that cyanobacteria growth was already well established at the time of the initial alum treatment. Therefore we feel that beginning the treatment program earlier in the growing season will help mitigate phosphorus levels before the onset of widespread cyanobacteria growth. By reducing phosphorus earlier in the season we can perhaps better prevent the establishment of problematic cyanobacteria and improve our ability to maintain desirable conditions throughout the remainder of the growing season. We recommend moving the initial treatment up to early May.
- In addition to starting the multi alum treatment program earlier in the growing season, we also feel that increasing the initial aluminum dose will improve the phosphorus reduction at this critical time of algae

development in West Monponsett Pond. The Phosphorus sampling indicates that the initial alum treatment provided an approximate 30% reduction in total phosphorus; however, the remaining phosphorus levels in early June were still above excessive phosphorus threshold of 30 ppb (mean TP 32 ppb). We therefore are recommending that this initial aluminum dose be increased from 0.7 ppm to 1.4 ppm. We feel that doubling the initial dose will effectively reduce phosphorus concentration below the 30 ppb threshold in the early season, which will better prevent the establishment of problematic cyanobacteria growth. Also by more aggressively reducing phosphorus in the early season it is more likely that subsequent lower dose treatments will be effective at maintaining concentrations or further reducing TP levels.

We feel that these proposed program modifications are necessary for the long-term maintenance of West Monponsett. If you have any questions about the 2015 program or our 2016 management recommendations please do not hesitate to contact our office.



# Appendix A

REVISED Habitat Management Plan for Phosphorus Inactivation in  
the Western Basin of Monponsett Pond



# REVISED Habitat Management Plan for Phosphorus Inactivation in the Western Basin of Monponsett Pond

Applicant: Town of Halifax  
499 Plymouth Street  
Halifax, MA 02338



Representative: Aquatic Control Technology  
21 West Main Street  
Spencer, MA 01562



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## ATTACHMENTS

### Maps

Dragonfly Cursory Survey and Potential Monitoring Locations  
Mussel Monitoring Stations  
Sample Locations for Chemical and Physical Assessment

### Schedule

**REVISED Habitat Management Plan for Phosphorus Inactivation in the  
West Basin of Monponsett Pond Halifax/Hanson, Massachusetts  
2015**

**SITE DESCRIPTION & BACKGROUND**

Monponsett Pond, located in the towns of Halifax and Hanson, Massachusetts, is a significant ecological, historical, and recreational resource as well as an important supplementary water supply for the nearby City of Brockton. The 528-acre pond is bisected by Route 58 which splits the water body into two basins - east and west - directly connected only by a small culvert in the southern portion of the pond. Both basins are highly developed with residential homes and receive inputs from a suburban watershed of approximately 6 mi<sup>2</sup>.

As a whole, Monponsett Pond has been heavily impacted by use of its waters and watershed, and both basins have been placed on the Massachusetts Integrated List of Waters (303(d) list). As of 2010, the eastern basin was categorized as a 4c water body for presence of exotic species and a Total Maximum Daily Load (TMDL) was published in 2007 for high concentrations of mercury. The western basin appears on the 2010 303(d) list as a category 5 water body for nutrients, noxious aquatic plants, turbidity, and exotic species. The presence of two exotic aquatic vegetation species; Fanwort (*Cabomba caroliniana*) and Variable Milfoil (*Myriophyllum heterophyllum*), have been recorded recently in the eastern basin, while presence of Fanwort was noted in the western basin.

Both basins have also been subject to algae blooms in the past several years; however, the western basin has undergone extensive algae blooms for the past 25 years. During the summers of 2010 and 2011 these blooms prompted the closure of the western basin to swimming and boating for much of the summer. Algae testing has been carried out both by the Massachusetts Department of Public Health (MA DPH) and Massachusetts Department of Environmental Protection (MA DEP) throughout the summer months. MA DPH also conducted analysis of water quality, including total phosphorus. These results show a definite association between concentration of total phosphorus and total cell count in the western basin throughout the summer.

Despite these water quality challenges, the western basin has been identified as an area of priority habitat by the Massachusetts Division of Fisheries and Wildlife (DF&W) Natural Heritage and Endangered Species Review Program (NHESP). The presence of the following three state-listed species of special concern has been confirmed as recently as June 2011: Tidewater Mucket (*Leptodea ochracea*), Eastern Pondmussel (*Ligumia nasuta*), and Umber Shadowdragon (*Neurocordulia obsoleta*).

**PROPOSED PHOSPHORUS INACTIVATION PROGRAM**

During the summer of 2013, Lycott Environmental conducted a low-dose buffered alum treatment of the West Basin of Monponsett Pond in accordance with the NHESP letter (09-27490) dated June 6, 2012 and the submitted Habitat Management Plan. As outlined in our recent report (Lycott – Low-Dose Alum Treatment Monitoring Report – November 14, 2014) the treatment program was performed without incident or observed short or long-term impacts to the rare species. Although this treatment approach was successful at reducing the internal total phosphorus concentration without impacting rare species, the phosphorus reduction was relatively short-lived. Post-treatment phosphorus testing indicated that phosphorus concentrations had returned to near pre-treatment levels within a month following the alum treatment. Therefore, in an effort to maintain a reduced phosphorus concentration at least throughout

the peak growing season (May-August), we are proposing the following modifications to the treatment program for your review and approval.

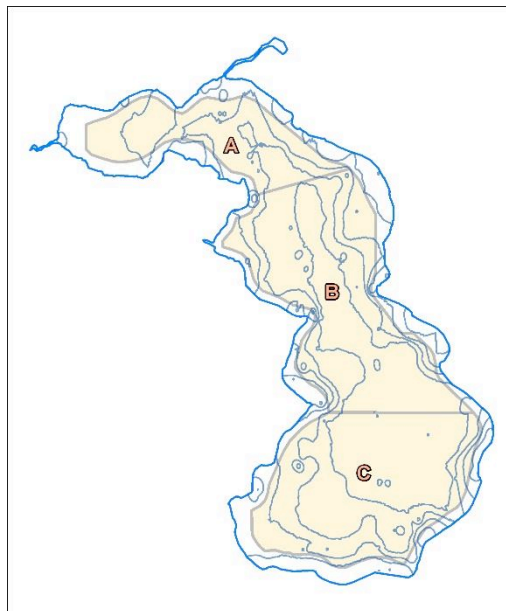
#### ***Aluminum Dose Modification***

Although jar testing and the results of the 2013 treatment program indicate that a 3 ppm aluminum dose can remove a high percentage of available phosphorus, it may likely be better in-terms of seasonal cyanobacteria bloom prevention to reduce this dose and perform more treatment events. For this reason we are proposing an individual treatment dose of approximately 0.7 ppm of aluminum. Despite this reduced aluminum dose, the buffering capacity associated with this system (alkalinity has been estimated at 11.5 mg/L  $\text{CaCO}_3$ ) will continue to require the application of sodium aluminate as a buffer. An aluminum sulfate to sodium aluminate ratio of 2:1 represents the theoretical balance point for pH in poorly buffered lakes such as Monponsett Pond, and therefore, the planned individual treatment dose is 3000 gallons of aluminum sulfate and 1500 gallons of sodium aluminate.

We anticipate performing a total of three treatments at this dose for a total dose of approximately 2.1 ppm of aluminum. We feel that by spacing this reduced overall dose over three individual treatments that we will not only extend the duration of phosphorus reduction, but also reduce the potential risk to resident rare species associated with the low-dose alum treatment.

#### ***Treatment Area Modification***

No change to the overall extent of the treatment area is proposed. As with the 2013 treatment program, the aluminum sulfate and sodium aluminate will be applied to areas of the West Basin that are deeper than four (4) feet – a total treatment area of approximately 235 acres. However, rather than split this overall treatment area into 2.77 acre treatment sectors, as was done in 2013, we are proposing to divide the overall treatment area into three zones with relatively uniform depth characteristics (Zone A – 45 acres; Zone B – 98 acres; Zone C – 92 acres). This approach will enable accurate dosing and more uniform application without increasing the risk to rare species.



#### ***Application Methodology Changes***

Treatment will be conducted with our specially equipped treatment vessel. The treatment vessel will be equipped with a fathometer and speedometer. The use of the speedometer enables us to prepare a

calibration table for chemical delivery (gal.) versus vessel speed (mph) which will insure even distribution of the alum and sodium aluminate. Suitable in-line pressure gauges and flowmeters to measure chemical delivery rates will also be used.

The treatment vessel will be equipped with 2 translucent polyethylene tanks with a combined capacity of 450 gallons. These tanks are also graduations on the outside, which allow our operators to visually monitor chemical delivery to insure the desired volumetric ratio is met.

Since the two chemicals cannot be tank-mixed prior to application, there are two separate pumping systems for each product including individual spray lines and drop-hoses. The chemical delivery spray boom will be mounted on the stern of the boat where the drop-hoses will emit the chemicals into the propwash of the outboard motor. Dispersing the chemicals into the propwash promotes flash mixing of the two products and ultimately excellent floc formation. Through our extensive prior alum/aluminate treatment experience, we have found that the use of this arrangement and application methodology provides the best results.

The treatment will be guided with an on-board differential GPS. The treatment vessel will be equipped with a field portable laptop connected to a Trimble XT GPS receiver. The laptop screen will show the pond and treatment area and treatment sector boundaries. The system logs the path of the treatment vessel with an accuracy of  $\pm 1$  meter. Each load of chemical will be logged and monitored.

A maximum of three low-dose buffered alum treatments will be performed, as described, during the course of the growing season. We anticipate that the treatments will be performed approximately four weeks apart beginning at the onset of active algae growth (i.e. May, June, and July). Each treatment is expected to be completed in one day.

## MONITORING PROGRAM

The table below outlines the components of the monitoring program and the goals of each. Details are provided in the following sections.

**Table 1: Monitoring Program Design**

Monitoring Component	Timing in relation to treatment	Location(s)	Goal
<b>Water quality</b>	Before, during, and after each application	3 established locations within each treatment zone	Evaluate short and long-term effects on water quality
<b>Measurement of flocculation</b>	During	1 visual recording; 6 measurement locations	Assess the amount of floc accumulated on the sediments
<b>Monitoring of state-listed species</b>	Before, during, and after One and five years following	5 paired plots	Evaluate short and long-term effects on these species identified by NHESP as potentially susceptible to the treatment



## Chemical and Physical Assessment of Treatment

### Water Quality Monitoring

The water quality monitoring plan for West Monponsett Pond will include sampling at a single location within each of the three treatment zones. Sampling collection will occur immediately prior to each treatment and several days following each treatment. In addition to the sample collection basic *in situ* testing will be performed throughout each alum application.

Each pre and post-treatment water quality sample will be analyzed for the following parameters.

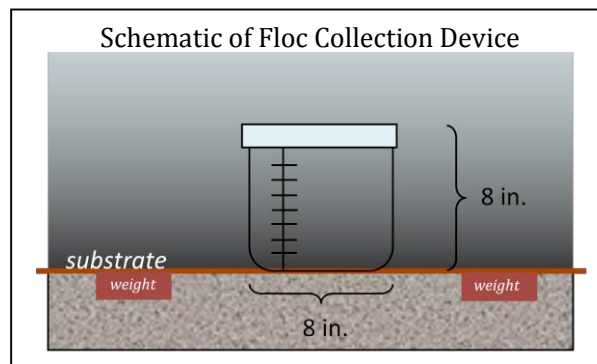
- pH
- Alkalinity
- Total Phosphorus
- Dissolved Phosphorus

The *in situ* testing that will be performed during treatment will include the following.

- Secchi depth
- Dissolved oxygen
- pH
- Alkalinity

### Measurement of Floc Deposition

In order to measure the amount of floc deposition occurring during the treatment, five floc-collection devices will be installed prior to the treatment and will be situated in close proximity to the *in situ* mussel monitoring stations (**Figure 1**). These devices will be designed to capture floc as it precipitates to the pond's bottom. Two graduated (in inches) floc-collection devices will be installed on weighted pieces of plywood or similar material that will be placed on the substrate. The depth of floc in each device will be measured by an underwater observer the day following treatment. Images of the devices and floc will be recorded during each observation period.



In an effort to observe flocculation as it occurs, an underwater video camera will be set up in a shallow treatment location where water clarity will allow visual observation.

## Monitoring of State-Listed Mussel Species

### Long-term Mussel Monitoring Program: Pre- and Post-Treatment Mussel Monitoring

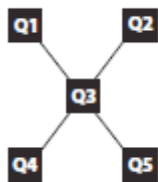
Since the submission of the original 'Habitat Management Plan' in May 2012, the pre-treatment and one year following the initial 2013 alum treatment long-term mussel monitoring event have been performed. Minor modifications to the proposed long-term mussel monitoring provided in the original 'Habitat Management Plan' were made by the NHESP-approved biologist performing these surveys. In order to maintain comparability with the five years post-alum treatment long-term mussel monitoring event, the modified survey methodology will be implemented at this time. This methodology was provided to the NHESP in a report titled, "Monitoring the Effects of Low-Dose Alum Treatment on *Leptodea ochracea*, *L. nasuta*, and *Neurocordulia obsoleta* in the Western Basin of Monponsett Pond (Halifax, Massachusetts)" and the relevant excerpt is copied below. Per a recent conversation with the NHESP, additional revisions to this methodology is indicated below in **bold** text.

*A third survey is planned for May 2018. The basic sampling unit [will be] a 1 x 1 meter (1m<sup>2</sup>) quadrat bounded by a frame, with two centerlines that [divide] the quadrat into four 0.5 x 0.5 meter sections. The centerlines facilitated more careful searching in the low-visibility environment. Quadrat locations [will be] marked with underwater markers and recorded with GPS to enable the precise area of each to be resurveyed. Five quadrats [will be] established at 10 sites (50 quadrats total); the 10 sites [will be] paired (one shallow, one deep) at five locations in the pond (Figure 1). The quadrats [will be] arranged in a consistent pattern at each site (Figure 2). For each quadrat, biologists [will] first [conduct] a visual and tactile search to count the number of mussels (all species) occurring at or near the surface. The biologists then [will excavate] and [sieve] sediment from within one-fourth (0.25m<sup>2</sup>) of the quadrat area to find buried mussels. Surface counts and buried counts [will be] recorded for each species, and shell length **and shell condition** [will be] recorded for *L. ochracea* and *L. nasuta*. Once these two steps [are] completed, all mussels [will be] placed back within the confines of the each quadrat. The following habitat information [will be] recorded for each quadrat: water depth, spatial extent of each substrate type, and percent cover of macrophytes. During the two post-treatment surveys, biologists [will] also [count] **and note shell condition** of freshly dead shells in addition to the steps described above.*

**Figure 1 & 2.** Mussel and Dragonfly monitoring stations (**Figure 1**) and quadrat arrange (**Figure 2**) derived from Biodrawiversity's 2014 report, "Monitoring the Effects of Low-Dose Alum Treatment *Leptodea ochracea*, *Ligumia nasuta*, and *Neurocordulia obsoleta* in Monponsett Pond."



**Figure 1.** Locations of mussel monitoring sites (Sites 1-5, including shallow and deep plots at each site) and dragonfly survey sites (E-1, E-2, and W-1 to W-7) in West and East Monponsett Pond in Halifax, MA.



**Figure 2.** Spatial array of 5 1.0 m<sup>2</sup> quadrats (Q) at each site. Bricks were left on the lake bottom at Q1, Q2, Q4, and Q5; these were connected by strings and the intersection of the two strings marked the location of Q3. These were easily installed in 2013 and found again in 2014.

#### In situ Mussel Monitoring: Behavioral Responses of Mussels to a Buffered Low-Dose Alum Treatment

The *in situ* monitoring program aims to investigate mussel behavioral responses of the two state-listed species mussel species, *L. ochracea* and *L. nasuta*, to the modified low-dose alum treatment approached proposed in this document. *In situ* monitoring will be carried out in the initial year (i.e., 2015) of the modified low-dose alum treatment and in the last year (2018) proposed under this habitat management plan. In these years, *in situ* monitoring will be conducted during the first of the three 0.7 ppm alum treatment events, when water clarity is at its best in the West Basin of Monponsett Pond.

A total of three locations will be selected for *in situ* monitoring of state-listed mussel species. *In situ* monitoring will be performed within the long-term monitoring stations (refer to map for **Figure 1**). *In situ* monitoring site locations will be selected based upon two criteria:

- At depths >4 ft. deep to correspond with the treatment area
- At locations with known presence of the two state-listed mussel species

Prior to treatment, the observer will visit the three *in situ* monitoring stations. At this time, the observer will place a drilled, PVC 1-m<sup>2</sup> quadrat and place it over a mussel bed containing at least three individuals. Each mussel will be plucked, identified to the species-level, measured, photographed, and returned to the substrate (not seeded). A fluorescent, 15" marker flag with a unique identification number will be placed

near each mussel, and all mussels will be allowed to acclimate for five minutes. Following the acclimation period, mussel behavior — pumping activity (active vs. inactive), valve activity (open vs. closed), positioning (upright vs. dislodged), foot activity (protracted vs. retracted) — will be qualitatively measured for a 30 minute period. This 30 minute time period will be further divided into 10 minute intervals assessing the mussel behavior of each of the 3 mussels (i.e., each mussel will be monitored for 10 minutes). This information will be necessary to establish a baseline for natural mussel activity in the absence of an alum treatment (i.e., control). Under optimal conditions, natural mussel activity is generally characterized by upright, prolonged active filtering interrupted by brief valve closures. Observations will be recorded in a waterproof field notebook.

It is anticipated that the modified alum treatment will require a full day to conducted treatment activities; therefore, performing *in situ* monitoring in the same day following treatment will not be possible. As such, mussel behavior will be again assessed one and three days following the treatment activities. *In situ* mussel behavior monitoring will be perform utilizing the same methodology prior to treatment. In the event that the quadrat has moved, the closest three mussels will be monitored utilizing the aforementioned *in situ* monitoring methods. Additionally, freshly dead mussel shells in or within close proximity to the quadrat will be counted, identified to the species-level, measured for shell length and erosion, photographed, and returned to the sediment.

### **Monitoring of State-Listed Dragonfly Species**

#### **Long-term Dragonfly Monitoring Program: Pre- and Post-Treatment Dragonfly Monitoring**

As stated above, since the submission of the original ‘Habitat Management Plan’ in May 2012, the pre-treatment and one year following the initial 2013 alum treatment long-term dragon-fly monitoring event have been performed. Minor modifications to the proposed long-term mussel monitoring were made by the NHESP-approved biologist performing these surveys. In order to maintain comparability during the five years post long-term mussel monitoring event scheduled for 2018, the modified survey methodology will be implemented at this time. This methodology was provided to the NHESP in a report titled, “Monitoring the Effects of Low-Dose Alum Treatment on *Leptodea ochracea*, *L. nasuta*, and *Neurocordulia obsoleta* in the Western Basin of Monponsett Pond (Halifax, Massachusetts)” and the relevant excerpt is copied below. No additional revisions were requested during our recent conversations with the NHESP.

*Dragonfly surveys, focusing on N. obsoleta ... [is scheduled to be completed in 2018]. Survey timing... [will]... accommodate weather conditions during the emergence period to ensure that surveys [are] conducted under the best possible conditions. Qualitative surveys of larvae, exuviae, and tenerals [will be conducted] using a combination of aquatic D-net sweeps in or near aquatic vegetation and other submerged structure, snorkeling in shallow water to hand-pick larvae, and walking along the shoreline to look for exuviae and tenerals on the lakeshore (especially rocks, bridge abutments, and trees). The causeway between the West and East basins [will be] surveyed most intensively, but several other locations in West and East Monponsett Pond [will] also [be] assessed and surveyed (Figure 1[see above]). Specimens [will be] collected, preserved in alcohol, and identified under a dissecting microscope.*

### **Monitoring of Fish and Wildlife Response to Treatment**

As in 2013, *in situ* in-water and shoreline monitoring will investigate mortality of fish and other wildlife as a consequence of the buffered low-dose alum treatment. During the buffered low-dose alum treatment, *in situ* in-water and shoreline monitoring for fish and/or other wildlife mortalities will be conducted by three parties: a treatment team and a survey team. *In situ* in-water and shoreline monitoring will proceed as follows:

➤ **Treatment team**

- Licensed applicator and assistant(s) will actively monitor the immediate treatment area for fish and/or wildlife mortality during application

➤ **Survey team**

- Hourly follow-up inspections of the treatment areas will be conducted in conjunction with water quality testing and floc measurements
- Quick (in-boat) visual inspection of pond's perimeter for fish and/or wildlife mortality following daily treatment activities

Any deceased fish and/or wildlife encountered during *in situ* in-water monitoring will be documented. Documentation will include: written observations regarding the counts (by species), time observed, and photographs of each specimen. All information pertaining to a fish and/or wildlife kill event will be immediately provided to the Division of Fisheries and Wildlife—Southeast (DFW-SE).





# Appendix B

Treatment Monitoring Program at the West Basin of Monponsett  
Pond Raw Data (Table 1-4)



**Table 1.** Pre- and post-treatment baseline water quality sampling results

Date	Treatment and Timing	Site ID	pH	TP (ppb)	DP (ppb)	TAlk (mg/L)	Turbidity (NTU)
6/2/15	1 <sup>st</sup> - Pre	A	7.0	44	27	7.2	X
		B	7.0	37	19	3.6	X
		C	7.0	57	29	6.2	X
6/5/15	1 <sup>st</sup> – 3-day post	A	7.5	33	21	ND	X
		B	7.5	32	18	ND	X
		C	7.5	31	15	8.2	X
6/10/15	1 <sup>st</sup> – 1-week post	A	7.8	39	X	8.8	4
		B	7.6	37	X	8.2	4
		C	7.4	38	X	8.2	3.7
6/30/15	2 <sup>nd</sup> – Pre	A	7.0	26	ND	7.7	X
		B	7.3	27	ND	8.8	X
		C	7.0	27	ND	9.3	X
7/3/15	2 <sup>nd</sup> – 3-day post	A	6.2	28	ND	8.8	X
		B	6.4	22	ND	8.8	X
		C	6.6	31	ND	9.3	X
7/13/15	2 <sup>nd</sup> – 1-week post	A	8.1	16	ND	8.8	5
		B	7.9	31	10	8.8	5.6
		C	7.6	19	ND	8.8	6.2
7/23/15	3 <sup>rd</sup> - Pre	A	7.0	20	ND	8.2	X
		B	7.5	11	ND	9.3	X
		C	7.5	16	ND	9.3	X
7/27/15	3 <sup>rd</sup> – 3-day post	A	7.5	23	ND	9.3	X
		B	7.0	27	ND	8.2	X
		C	7.3	27	ND	9.3	X

**Table 2.** Pre- and post-treatment additional water quality sampling results

Date	Treatment and Timing	Site ID	Depth	T (°C)	DO (mg/L)	DO (% saturation)	Secchi (ft)
6/2/15	1 <sup>st</sup> - Pre	A	Near Surface	17.7	8.02	84.2	4
		B	Near Surface	18.8	8.06	86.5	4
		C	Near Surface	18.4	8.14	86.7	3.5
			3 feet	18.4	8.14	86.7	
			4 feet	18.4	8.14	86.6	
			5 feet	18.4	8.13	86.6	
			6 feet	18.3	8.14	86.6	
			7 feet	18.3	8.15	86.6	
			8 feet	18.3	8.16	86.1	
			9 feet	18.3	8.17	86.8	
			10 feet	18.3	8.18	86.9	
6/3/15	1 <sup>st</sup> – 1-day post	A	Near Surface	17.8	8.82	92.9	4
		B	Near Surface	17.3	8.88	98.6	5
		C	Near Surface	17.8	8.82	92.9	4
			3 feet	17.7	8.84	92.7	
			4 feet	17.7	8.82	92.6	
			5 feet	17.7	8.81	92.4	
			6 feet	17.7	8.79	92.2	
			7 feet	17.6	8.76	91.7	
			8 feet	17.6	8.71	91.2	
			9 feet	17.5	8.57	88.9	
			10 feet	17.5	8.38	87.6	
6/5/15	1 <sup>st</sup> – 3-day post	A	Near Surface	20.6	9.63	107.1	4.5
		B	Near Surface	20.1	9.65	106	4.5
		C	Near Surface	19.2	9.68	104.8	4.5
			3 feet	19	9.67	104.3	
			4 feet	18.8	9.67	103.8	
			5 feet	18.6	9.67	103.4	
			6 feet	18.2	9.63	102.2	
			7 feet	18.2	9.47	100.2	
			8 feet	17.9	9.41	99.6	
			9 feet	17.7	8.50	89.2	
			10 feet	17.8	8.52	89.3	
6/30/15	2 <sup>nd</sup> – Pre	A	Near Surface	22.2	7.95	91.3	4
		B	Near Surface	22.1	7.60	87.3	3.75
		C	Near Surface	22.7	7.40	85.5	3.5
			2 feet	22.4	7.40	85.5	
			3 feet	22.1	7.33	84.7	
			4 feet	21.9	7.20	81.9	
			5 feet	21.8	6.96	79.3	
			6 feet	21.8	6.81	77.6	
			7 feet	21.8	6.63	75.4	
			8 feet	21.8	6.32	72	

Date	Treatment and Timing	Site ID	Depth	T (°C)	DO (mg/L)	DO (% saturation)	Secchi (ft)
			9 feet	21.8	6.95	68.8	
			10 feet	21.8	5.65	64.1	
7/1/15	2 <sup>nd</sup> – 1-day post	C	Near Surface	23.1	7.57	88.4	3.5
			4 feet	23.1	7.54	88.1	
			5 feet	23.1	7.57	88.6	
			6 feet	23	7.61	88.7	
			7 feet	23	7.58	88.3	
			8 feet	23	7.57	88.2	
			9 feet	23	7.51	87.5	
			10 feet	22.9	7.43	85.7	
			11 feet	22.2	7.74	55.1	
7/24/15	3 <sup>rd</sup> – 1-day post	C	Near Surface	27.2	8.39	105.7	3
			3 feet	27.2	8.36	105.3	
			4 feet	27.2	8.35	105.2	
			5 feet	27.1	8.35	105	
			6 feet	27.1	8.32	104.6	
			7 feet	27.1	8.30	104.5	
			8 feet	27.1	8.30	104.4	
			9 feet	27	8.14	102.5	
			10 feet	26.3	6.20	76.7	
7/27/15	3 <sup>rd</sup> – 3-day post	A	Near Surface	X	X	X	3
		B	Near Surface	25.1	8.15	98.7	3
		C	Near Surface	25.2	8.01	97.2	3
			3 feet	25.1	7.98	96.7	
			4 feet	25	7.92	95.9	
			5 feet	25	7.9	95.6	
			6 feet	25	7.87	95.2	
			7 feet	25	7.83	94.8	
			8 feet	25	7.79	94.1	
			9 feet	24.9	7.72	93.4	
			10 feet	24.8	6.94	83.6	

**Table 3.** *In situ* flocculation measurement data

Date	Treatment and Timing	Mussel Monitoring Station	Floc Deposition (in)
6/4/15	1 <sup>st</sup> – 1-day post	1B	0.150
		2B	0.057
		3B	0.117
		4B	0.150
		5B	0.233
7/1/15	2 <sup>nd</sup> – 1-day post	1B	0.083
		2B	0.067
		3B	0.027
		4B	0.167
		5B	0.127
7/23/15	3 <sup>rd</sup> – 1-day post	1B	0.05
		2B	0.04
		3B	0.06
		4B	0.04
		5B	0.10

\*Note: Devices were installed from the surface (rather than in-water) due to unsafe cyanobacteria levels. Additional complications offer an explanation for the decreased floc accumulation during the third alum application event.



**Table 4.** Summary of mussel monitoring observations

Site ID	Mussel Density* (m <sup>-2</sup> )	General Mussel Observations		
		Pre	1-Day Post***	4-Day Post***
1B	High (9 – 15 mussels m <sup>-2</sup> )	Mussels deeply to partially burrowed (~25-50% exposed), upright, and actively filtering with intermittent, brief aperture closures	Majority of mussels deeply to partially burrowed (~25-50% exposed), upright, and actively filtering with intermittent, brief aperture closures; 3 mussels dislodged**	Mussels partially burrowed (~50% exposed), upright, and actively filtering; 2 mussels dislodged**
2B	Medium (4 – 8 mussels m <sup>-2</sup> )	Mussels partially burrowed (50% exposed), upright, actively filtering with intermittent, brief aperture closures	Majority of mussels deeply to partially burrowed (~25 - 50% exposed), upright, actively filtering with intermittent, brief aperture closures; 2 mussels dislodged**	Mussels deeply to partially burrowed (~25 - 50% exposed), upright, actively filtering with intermittent, brief aperture closures; 1 mussels dislodged**
4B	Low (1 – 3 mussels m <sup>-2</sup> )	Mussels deeply burrowed (~25% exposed), upright, and actively filtering	1 mussel partially burrowed (50% exposed) upright, active filtering; 1 mussel dislodged**	1 mussel deeply burrowed (25% exposed) upright, actively filtering with several brief aperture closures; 1 mussel partially burrowed (50% exposed), upright, actively filtering

\* Repeated movement of the boat from wave/wind action (despite securely anchoring and tying off to the shore) likely resulted in monitoring both within and immediately outside the 1-m<sup>2</sup> area. Therefore, precise density counts were not possible. Alternatively, each site was assigned a density category based on the approximated mussel abundance within the 1-m<sup>2</sup>.

\*\* Dislodged mussels were likely caused by collision with the stability rod during monitoring.

\*\*\* No freshly spent mussels were noted during the 1-day and 4-day post short-term mussel monitoring.