

City of Brockton, Massachusetts

Resource Management Plan Scope of Work

Response to Comments

The City of Brockton, Massachusetts (City/Brockton) entered into an Administrative Consent Order (ACO) with the Massachusetts Department of Environmental Protection (MassDEP). The ACO has two major components:

- Preparation of a Resource Management Plan (RMP), based on scientific data and evaluation, that will include recommended metrics and operating procedures for water supply diversions from Monponsett Pond to Silver Lake, and downstream releases at Stump Brook Dam intended to improve the pond's water quality, maintain existing habitat, and optimize drinking water supply, recreational and agricultural uses.
- Update of the Comprehensive Water Management Plan (CWMP Update) for Brockton's water system. This update is intended to review Brockton's long-term water supply strategy including water supply needs, water withdrawal management, purchase of water from Aquaria, water conservation and drought management, environmental impact management, the potential needs of its wholesale customers, and the feasibility/impact of releases to local streams.

The focus of this document is the RMP. The RMP needs to be completed prior to preparation of the CWMP Update in order to integrate the RMP findings into the CWMP Update. The RMP scoping process included:

- Preparing a draft scope of work, including several meetings with MassDEP to discuss the intent and scope of the ACO requirements.
- Issuing the draft scope of work for public comment, including public notices in the Patriot Ledger, Brockton Enterprise and Environmental Monitor. The draft scope of work was issued on January 24, 2018 and was available for public comment through February 26, 2018. The document was posted for viewing/download on the City's website and the Town of Halifax's website. Paper copies were also made available at Brockton City Hall, Halifax Town Hall and Hanson Town Hall.
- Holding a public meeting on February 6, 2018 at the Arnone Elementary School. A joint presentation was given by MassDEP and CDM Smith. Attendees were then given an opportunity to ask questions and comment on the draft scope of work.
- Preparing the final scope of work, including several meetings with MassDEP to discuss the intent and scope of the ACO requirements.
- Submitting the final RMP scope of work for MassDEP review and approval on July 19, 2018. The final scope of work and this response to comments have been posted for viewing/download on the City's website and the Town of Halifax's website. Paper copies

were also delivered to commenters, and made available at Brockton City Hall, Department of Public Works office.

Pending MassDEP approval, the City will proceed with the tasks outlined in the final RMP scope of work. It is assumed that the RMP will take about 18 months to complete. Prior to submitting the RMP to MassDEP, the City will hold another public meeting, as well as receive written comments during a public comment period, to solicit input. The CWMP Update will be prepared following MassDEP's approval of the RMP.

The remainder of this document presents written comments received during the comment period, and responses to these comments. Information provided below contains comments directly related to Monponsett Pond and the RMP scope of work. Comments related to the CWMP Update are not included in this document but will be considered during preparation of the CWMP Update scope of work. Complete copies of the comments received are appended to this document.

William Sheahan, Westport, MA (via e-mail 2/7/18)

Comment: "I was at the public hearing last night. From a high level it seems that the West Pond is being starved of its normal flushing flow from the East Pond. Since the West pond feeds the East pond and a large volume of natural flow that would flow from West to East (~12-14mgd) is being diverted to Silver Lake the West Pond is not getting the natural flushing it should.

I understand that there are many variables that are impacting the health of the Ponds East and West.

Some things to consider when looking at alternatives to the current operating scenarios.

- 1. Feasibility study on moving the diversion point to Silver Lake and having a combined diversion and spillway at the outlet of the West pond in the North West section of pond. By using two weirs one to the diversion and one to the dam you can easily measure the flow and volume going to each. The diversion pipe could be a HDPE line anchored to the bottom of the ponds and attached to the existing diversion point in the East Pond. The spillway could be an adjustable weir that could control the amount of flow going to the Brook dam.*

If this was possible you can obtain high turnover in both ponds and not just the East Pond. An this may solve the issue of algae blooms and make more water available for use year round.

- 2. Any thoughts on dredging the ponds to make them deeper? Bathymetric data should be taken for both Ponds and compare to past data taken to see if the pond depths have changed.*
- 3. Will there be a review of the size and location of the channel between the East and West Ponds?*

I thought the meeting was well run and informative."

Response: The natural flow path through Monponsett Pond is from the east pond to the west pond via the Rte. 58 box culvert, and then northerly to Stump Brook. Brockton has historically made intermittent diversions of roughly 25 million gallons per day (mgd) from the east pond to supply water to Silver Lake. It is believed that Brockton's diversions temporarily reduce the flow of water

from east pond to west pond, including a potential for reversal of flow through the culvert (from west to east) during diversions.

Brockton has reduced its diversion rate by roughly half (12-14mgd). The RMP includes studies that will look at the effect of varied Silver Lake diversion rates and Stump Brook release rates on the direction and rate of flow between the two halves of Monponsett Pond to better understand this relationship. With that information, the City can make more informed operations decisions regarding overall pond management.

With regard to Question 1 above, relocating the Silver Lake diversion intake structure to the West Pond would be a very high cost/high environmental impact solution, which would be difficult to implement. The RMP will look at lower cost, lower impact solutions to improve conditions in West Monponsett Pond and protect the quality East Monponsett Pond.

With regard to Question 2 above, we understand that bathymetry of the east pond was performed in 2017, and bathymetry of the west pond was performed earlier this year (2018) by Massachusetts Division of Fisheries and Wildlife. Historical bathymetry may also be available for comparison with this recent data, but a detailed analysis is not planned. Comparison of bathymetry data may be difficult due to differing techniques used to collect/compile the data; different techniques were even used for developing the most recent east and west pond bathymetry. Additionally, the shallowing of ponds is a natural phenomenon and should not be considered abnormal. It is assumed that historic and recent bathymetric information will be available for use in preparing the RMP.

With regard to Question 3 above, the RMP initially proposed to look at the potential benefits/impacts of altering the flow between east pond and west pond; however, due to significant negative comments received, the City has elected to not move forward with plans to evaluate flow altering devices between East and West Monponsett Pond. MassDEP concurs with this decision.

John Delano, Chairman, Halifax Board of Health (via e-mail from Cathleen Drinan 2/8/18)

Introduction from Cathleen Drinan

I am submitting some thoughts from the chairman of the Halifax Board of Health regarding causes of phosphorous loading in the West Monponsett Pond.

We are hoping, as stated in the ACO with Brockton, that you will work with Halifax, Hanson and the cranberry growers to reduce and better manage the inputs of phosphorous.

Attached Document entitled "John Delano-s [Facebook] post about agriculture-algae-DEP.docx"

Comment:

January 27 at 10:36am ·

The January 2018 trade journal, ONSITE INSTALLER, reported that a \$812,000 study on the performance of onsite septic systems demonstrated that only 5% of the systems were out of compliance. The study was done due to the polluted condition of Lake Osakis, Todd County, MN. "Lake

Osakis is polluted, 7,000 acres of pea soup” according to Chris Arens, Todd County Land Use Planner. I thought this situation sounded like the West Monponsett Lake here in Halifax, MA. Being on the Board of Health, I know we have had many failed septic system upgraded to stem the pollution of groundwater which finds its way to the lake. Knowing this and I also know that the other MAJOR pollution source is AGRICULTURAL. It just happens that we have Cranberry Bogs and a LARGE FARM in the watershed contributing to the lake. So I wondered what the area around Lake Osakis, MN looked like. Google Earth gave me the answer. Voilà! There are LARGE areas of farm fields around the lake. Runoff of the phosphorous from their fertilizing is the major cause in my opinion. An article in the OSAKIS REVIEW published in December of 2016 “identifies agriculture runoff as the main source of phosphorus getting into these lakes”. SAME here for Halifax's West Monponsett Lake. Agriculture is sacrosanct here in MA and in the US. But they need to be made to adhere to practices that are much more stringent than just ‘Best Management Practices’. To Halifax residents and the Monponsett Watershed Association, let's get our local state politicians to go after DEP to establish stringent water quality runoff standards for cranberry operators and farmers. If we don't, Halifax is going to have to pay more and more to clean-up the West Monponsett Lake as part of the EPA's nationwide enforcement of the Clean Waters Act at no fault of ours. Rise up as a town and fight for our financial well-being. This is serious business.

Response: The City has no jurisdiction regarding land use or stormwater controls within the Towns of Halifax and Hanson, including cranberry agriculture. This RMP will look at the pond's water balance and flow patterns, and possible beneficial modifications to Brockton's Silver Lake diversion structure and Stump Brook Dam operations to aid work by others. ACO Section 33g requires that the RMP also include a recommended actions list with a preliminary feasibility assessment of action items that could be performed by others with the necessary jurisdictional authority. The City and others need to collaboratively work together toward improved pond water quality.

Cathleen Drinan, Health Agent, Halifax, MA (via email 2/12/18)

“I am writing to comment on the Resource Management Plan being drafted/composed for the City of Brockton.

There are two main points of concern I would like to share at this time.

- 1. Although the document is called Resource Management Plan, I cannot find any mention of the City of Brockton being required to issue and enforce mandatory water restrictions in the city.*

Response: This work is beyond the scope of the RMP but will be part of the CWMP Update that will follow the RMP. The CWMP Update will include a review of the specific triggers and actions for implementation of water use restrictions.

- 2. Secondly, I am very concerned about the “fuzzy” wording that is so non-committal. What will require Brockton to meet goals and timeframes with this kind of wording? I see terms such as “explore”, “possible”, “could” and “potential”. This is worrisome as the language means there is no commitment for any actual improvement of management and water quality which is the purpose of this document and the ACO.*

a. *Examples:*

- i. *Page 2 Paragraph 2 reads: "Possible changes to operating practices will also be examined that consider current pond uses water quality issues, and water supply needs."*
 1. *Would request the word "possible" be deleted in this specific case*
- ii. *Page 2, final bullet reads: "Brockton Water Department and Veolia staff will explore possible changes to operating procedures that could:"*
 1. *Would request this is changed to: "Brockton Water Department and Veolia staff will target changes to operating procedures that will:"*
- iii. *Page 3 second bullet reads: "reduce the potential degradation of East Monponsett Pond, minimizing control of flow from West Monponsett Pond to East Monponsett Pond, especially during algal blooms."*
 1. *Would request the word "potential" be deleted in this specific case.*

In conclusion, the "do nothing" alternative is kept alive with non-committal "enforcement" wording. That is not an option at this point for the Monponsett Ponds or Silver Lake.

Response: The final scope of work includes more definitive wording and goals. Brockton is a partner, working toward improving conditions in Monponsett Pond. However, the City cannot commit to an outcome prior to performing the RMP analyses, nor can they definitively assure water quality improvements where causes and/or impacts are outside its jurisdiction.

Brendan Kling, Brian Kling and Jeanne Kling, Halifax, MA (via letter dated 2/12/18)

Thank you for your informative presentation at the Arnone School on Feb 6th. We are so thankful that steps are being taken to address the condition of Monponsett Pond. It is our hope that through your diligent work and collaboration with all parties there will be significant improvement in the water quality of our pond. The potential harmful health problems associated with Monponsett Pond are very much a concern to us.

Here are some requests that we would like to be considered for inclusion in the Monponsett Resource Management Plan:

- 1) *Please include testing for phosphorus levels at different locations around the ponds.*

Response: MassDEP (in conjunction with the Massachusetts Department of Public Health (MassDPH)) has, and plans to continue, cyanobacteria sampling at several locations in Monponsett Pond. They also plan to perform a Water Quality survey of Monponsett Pond between June and September 2018. Parameters include: cyanobacteria and phytoplankton, algal toxins, nutrients (total phosphorus, total nitrogen, ammonia, color and turbidity), secchi depth, chlorophyll a, dissolved oxygen, temperature, pH, and conductivity. Details of this plan are provided in the draft *Sampling and Analysis Plan, 2018 Baseline Lakes Monitoring – CN# 492.0* (MassDEP, December 2017).

Brockton will also perform water quality testing of grab sampling for nutrients, dissolved oxygen, temperature, pH, and conductivity during up to four selected flow release/diversion scenarios in Task 4.

The RMP will include a summary of this data, as available.

- 2) *Please make available regular communication updates of progress reports to the public. We would suggest a monthly or quarterly posting on Halifax, Brockton, and Hanson town websites.*

Response: The RMP document in its entirety will be shared during the public comment period, held near its completion. The partial release of results could create the potential for public misunderstanding of incomplete analyses and would be counterproductive.

- 3) *Provide a clear timeline of benchmark dates for each task throughout the plan. Use proactive language throughout the plan (i.e. change "whenever possible" to a more positive statement such as "will improve")*

Response: A tentative timeframe for each task can be included in the scope of work. Some tasks will be completed within a short timeframe; others will take some time. The final scope of work will include more definitive wording and goals.

- 4) *Provide concrete and measurable goals for expected levels at the various benchmark dates (i.e., water quality, cyanobacteria level)*

Response: Improved pond water quality, including cyanobacteria levels, will take time and a collaborative effort. Brockton is a partner in that effort, working toward improving conditions in Monponsett Pond. The City has jurisdiction of Silver Lake diversion structure and Stump Brook Dam operations only. It cannot commit to an outcome prior to performing the RMP analyses, nor can they definitively assure water quality improvements where causes and/or impacts are outside its jurisdiction.

- 5) *Oversight is needed to check that the RMP is carried out properly. Will the DEP be signing off for each step of the plan?*

Response: MassDEP will approve the RMP scope of work, prior to the City proceeding with the planned studies. Additionally, periodic coordination meetings will be held with MassDEP throughout the study. There will also be an open dialogue for transfer of information and data. The draft RMP will be published for public comment. MassDEP will then review the document for conformance with the ACO requirements and approved scope of work. ACO Section 37 then requires the City implement the RMP recommendations within six months of MassDEP approving the final RMP document.

6) *Please consider alternative solutions to the problem.*

Response: The City is open to alternative operations where their actions can improve conditions in Monponsett Pond. However, the City cannot assure water quality improvements where causes and/or impacts are outside its jurisdiction.

7) *Would you be willing to speak with long-term residents of the pond to discuss water quality?*

Response: The City's representatives have had discussions with area residents and are aware of their concerns. No further discussions are planned.

We are looking forward to the next meeting and the approval of a plan that will make a difference to the water quality of Monponsett Pond.

Debra Pasquale, Monponsett Watershed Association (via e-mail 2/17/18)

Comment: Regarding The Resource Management Plan. The part about placing any kind of plug or anything to separate the East and West Monponsett ponds is a disastrous idea. This will further unable the west pond to flow naturally and the stagnant condition of the pond will turn it into a swamp. The West pond already suffers from cyanobacteria counts in the millions above the threshold. I live on the West pond and have witnessed the already horrible unhealthy conditions from the cyanobacteria. I have seen it grow increasingly worse for the past 8 years. In the summer months I have had to leave my house because of the unbearable unhealthy conditions. It's not only the thick pea soup green slime algae in the water but it's also in the air. The smell is chemical and choking. Something must be done to help improve the water quality. Separating this one whole natural resource is not the answer. Although Brockton seems to have good intentions for the East Pond. I believe their main goal is keeping the East Pond healthy for the Brockton water supply. It seems to me that we all should never in any way allow the West pond to be of any less importance. Please do not allow the ponds to be separated in any way. As a resident of West Monponsett and also a member of The Monponsett Watershed Association. I have been advocating for the restoration and preservation of Monponsett Pond. Many more of the residents here share many of my concerns. We do not feel the separation if the pond is in the best interest of the health of Monponsett.

Many of us advocate for a better idea like for Brockton to just OPEN THE GATE WHEN NOT DIVERTING. Also dredging may be a big help. These seem to us like much more efficient and simpler answers to restoring the Natural flow of this natural resource.

Response: The Draft RMP scope of work proposed the possibility of evaluating a temporary barrier between east and west ponds. The hypothesis to be tested was that such a barrier could both protect the east pond during cyanobacteria blooms and could also be beneficial as part of a west pond flushing scenario by impounding the east pond and then sending a flush of water into/through west pond. There was no intent to further degrade west pond. In response to the public comments received in opposition to the evaluation of a temporary barrier between east and west pond, the City will not investigate the temporary barrier. MassDEP concurs with this decision. Improved pond water quality will take time and a collaborative effort. Brockton is a partner in that

effort, however, other parties would be responsible for dredging, treatments, stormwater and land use management, etc. The City is responsible for Silver Lake diversion structure and Stump Brook Dam operations only. It cannot commit to an outcome prior to performing the RMP analyses, nor can it definitively assure water quality improvements where causes and/or impacts are outside its jurisdiction.

Suzanne Lillie, Monponsett Watershed Association (via e-mail 2/20/18)

I am pleased to see publication of the draft City of Brockton, Massachusetts Resource Management Plan Scope of Work (RMP). I am also pleased to have the opportunity to submit comments regarding the RMP.

TWO GENERAL COMMENTS

1. *In its current bulleted format, the document it is difficult to reference specifics. It will also be difficult to monitor changes in subsequent versions.*

It is optimal to use an outline format that includes numbers and letters for specificity.

Example:

1. *Task 1*

- a. *Item 1*

- i. *Sub-item 1*

- ii. *Sub-item 2*

- b. *Item 2*

Response: The current bulleted format meets MassDEP's and the City's needs. Reformatting would not impact the content of the project scope and is, therefore, not planned.

2. *The only date included in the RMP is in Task 1, bullet 5: The public meeting will be on February 6, 2018. Aside from this published date, the RMP includes no specific dates. The ACO was issued by DEP on 3/22/17. Does the public meeting date miss the requirement of ACO #33?*

When exactly is the date defined as: Within six months of the effective date of this Consent Order, the Respondent shall submit for MassDEP review and approval a proposed Final Scope of Work ("SOW") for preparation of a Resource Management Plan (the "Plan")...?

Response: As David Johnston from MassDEP noted at the public meeting, the milestone dates within the original ACO are being modified based on necessary discussions prior to and during preparation of the draft scope of work. These discussions pushed out the timeframe for the public meeting and subsequent milestones.

TASK SPECIFIC COMMENTS

1. *Task 2, Bullet 6 – Solicit input from the University of Massachusetts regarding cranberry agriculture management*

Comment: Relying on industry affiliated groups like the Cape Cod Cranberry Growers Association and the University of Massachusetts provides high level industry and research information. The most valuable information is from the actual owner of the bog adjacent to West Monponsett Pond, Morse Brothers Inc. Owners of cranberry bogs that drain into either basin should also be consulted directly, even if their bog is abandoned.

Response: MassDEP and the City have met with Morse Brothers Inc. and found that only a small portion of the Winebrook bogs drain agricultural return flows into Monponsett Pond. MassDEP is working with current bog operators to ensure compliance with its regulations. Bog operations are subject to 330 CMR 31.00 (Plant nutrient application requirements for agricultural land and non-agricultural turf and lawns) which requires compliance with current Best Management Practices (BMPs) for agricultural discharges to the tributary streams and/or the pond itself. MassDEP is working with the bog owners regarding BMPs and notification of discharges. Brockton will work with MassDEP to get a better understanding of agricultural uses but has no jurisdictional authority to control land uses within the Monponsett Pond watershed.

2. *Task 2, Bullet 9 – Brockton Water Department and Veolia staff will explore possible changes to operation procedures that could....*

Comment: This language is loose at best. Suggested change: Brockton Water Department and Veolia staff will shall explore possible necessary changes to operation procedures that could will....

Response: The final scope of work will include more definitive wording and goals. However, the City cannot assure water quality improvements where causes and/or impacts are outside its jurisdiction.

3. *Task 2, Bullet 9, Sub-Bullet 2 – Reduce the potential degradation of East Monponsett Pond, minimizing control of flow from West Monponsett Pond to East Monponsett Pond, especially during algal blooms.*

Comment: Reverting natural flow of water from East to West is an admirable goal. Prevention of algal blooms to protect the health of all is of utmost importance. As noted in the ACO, the Brockton Board of Water Commissioners voted to not divert whenever testing indicates there is a cyanobacteria bloom in West Monponsett Pond that exceeds the MDPH standard of 70,000 cells/ml. Surely this endorsement should include East Monponsett Pond also.

Response: You are correct that the Brockton Board of Water Commissioners voted to not divert whenever testing indicates cyanobacteria levels in West Monponsett Pond exceed the MDPH standard of 70,000 cells/ml. The vote reflected the fact that West Monponsett Pond

has periodically exceeded this standard, and not East Monponsett Pond. However, it is the City's intention and practice not to divert water from Monponsett Pond to Silver Lake if either east or west pond shows cyanobacteria testing results that exceed the MassDPH standard of 70,000 cells/ml.

4. *Task 4, Bullet 2 – Flow measurement observations under varied conditions. The first three conditions include reference to diversion rate.*

Comment: Diversion rate must be quantified in mg/d or hrs/day or a combination thereof. Is full diversion rate x mg/d or is it diversion over a 24-hour period? Or is Full diversion rate a combination of both volume and time? To evaluate these scenarios comparatively, diversion rate must be quantified.

Response: target flow rates noted for the test conditions represent a relationship of discharge volume and time; not referenced to a specific 24-hour window. Flow rates are often calculated based on weir or pipe configuration and observed depth or velocity.

5. *Task 5 – Estimate Variable Seasonal Releases to Stump Brook*

Comment: Multiple tasks are listed referring to an evaluation of high spring flushing rates. Where are the tasks related to ACO p 8 item 33g?...installation of a control structure between East and West Monponsett. These tasks must be identified and published.

Response: The RMP will include a list of potential action items that could be performed by others, as required by ACO Section 33g. The ACO text notes several measures that could be performed by others including septic system upgrades, stormwater controls, the installation of a control structure and chemical treatment. These action items would be outside of Brockton's jurisdiction for study or implementation.

Pine duBois, Executive Director and Alex Mansfield, Ecology Program Director, Jones River Watershed Association (dated 2/22/18)

[Note: text directly related to Monponsett Pond and the RMP are provided below. A complete copy of the comment letter is appended to this document.]

The transfer of Monponsett Pond and Furnace Pond waters into Silver Lake also transfers the water quality impairments of those systems into Silver Lake. As a result, the dimensions of our 'watershed' have become unnaturally influenced by and unfortunately intermingled with these two other watersheds. The Resource Management Plan needs address all of the impacts caused by the deliberate manipulation of these supplies.

General Comments:

The RMP (Resource Management Plan) Draft SOW (Scope of Work) has been prepared in compliance with the ACO (Administrative Consent Order) between Brockton and the DEP (Department of environmental Protection) of March 22, 2017, in which Brockton and the DEP agree to abandon, and reduce the requirements of the previous 1995/97 ACO. That previous document required, among other

tasks, that Brockton investigate, plan for and produce additional sources of water to address its chronic shortages and the adverse impacts diversions cause within its existing water supply system, in particular, on Silver Lake, Monponsett and Furnace Ponds. Although those issues have not yet been corrected the current ACO fails to consider (or even mention) them. While we understand that this comment period is specific to the Draft SOW for development of the RMP, we find that the 2017 ACO itself fails to address the elements that should be included in reasonable RMP, and RMPs are needed for each of the impaired water supply sources, not just Monponsett Pond. Specifically, critical resources (Silver Lake and Furnace Pond) are ignored.

The Draft SOW sets out tasks that appear to be limited, and should be expanded in order to properly address both the current ACO and the historic water supply shortages and resulting degradation of state controlled natural resources caused by Brockton's water supply management. We will expect that the SOW for the (Comprehensive Water Management Plan) CWMP will focus not only on one Ch. 91 license held by Brockton, but on the Drinking water standards and natural resource protection that is required of all who use and manipulate Great Ponds in the Commonwealth.

Response: The ACO was negotiated between the City of Brockton and MassDEP. The ACO states MassDEP's position that Brockton was not in compliance with certain, limited aspects of its Chapter 91 License that authorizes both the Stump Brook Dam and Silver Lake diversion structure, specifically, in MassDEP's view, for issues associated with Monponsett Pond's suitability for boating and bathing, etc. Brockton has agreed to perform the work included in the ACO and accept the costs to do so. Brockton believes the RMP scope of work was prepared in accordance with the requirements of the ACO and has benefitted from thoughtful public comment. The RMP scope of work is limited to evaluating ways that Brockton can operate its structures – the Stump Brook Dam fish ladder and sluiceway, and Silver Lake diversion structure – to help control the pond's water balance and flow patterns, and cyanobacteria levels. Reviews of overall water system operations and demand management will be addressed in the CWMP Update and are not part of this scope of work.

Specific Comments on the SOW:

This SOW should address the following additional items:

- *Water quality of Monponsett Ponds including Phosphorus, aluminum, mercury, lead, and other elements that if transferred, will continue to degrade the water quality of Silver Lake. As currently written the SOW addresses only water levels and flow characteristics. These are presumed to have direct influence on water quality characteristics. Rather than simply assume, we recommend that SOW include specific water quality testing in order to show conclusively how the experiments of flow manipulations influence the water quality. We recommend a series of water quality sampling points in Stump Brook, West Monponsett, East Monponsett, and Silver Lake.*

Response: MassDEP plans to perform a water quality survey of Monponsett Pond between June and September 2018. Parameters include: cyanobacteria and phytoplankton, algal toxins, nutrients (total phosphorus, total nitrogen, ammonia, color and turbidity), secchi depth, chlorophyll a, dissolved oxygen, temperature, pH, and conductivity. If available, the

results of these tests could be used in preparation of the RMP and presented in the RMP document.

Brockton will also perform water quality testing of grab sampling for nutrients, dissolved oxygen, temperature, pH, and conductivity during up to four selected flow release/diversion scenarios in Task 4.

- *Invasive plants, especially in East Monponsett Pond that have been and are continuously transferred to Silver Lake. The RMP should discuss how to control the presence of the plants (see Lycott 2013 and any following info from Halifax) and what measures will eliminate any potential for transfer to Silver Lake.*

Response: It is the City's understanding that MassDEP performed a macrophyte/bathymetry survey of East Monponsett Pond in 2017. They plan to perform a macrophyte/bathymetry survey of West Monponsett Pond in 2018. Our understanding is that these surveys address vegetative coverage/density rather than noting specific plant species. If available, the results of these studies could be used in preparation of the RMP and presented in the RMP document for informational purposes.

While the TMDL under development by MassDEP has identified invasive plants as an issue of concern in Monponsett Pond, invasive plants are not the basis for the ACO. Rather, the basis for the ACO is the City's diversionary operations, alleged to be noncompliant with the City's Chapter 91 License, due to its impact on existing excess phosphorus discharged by others and the attendant cyanobacteria blooms that impact boating and bathing in Monponsett Pond. Accordingly, the RMP scope of work is focused on improving Stump Brook Dam and Silver Lake diversion structure operating practices that will help mitigate the conditions that contribute to cyanobacteria blooms.

Evaluation of invasive species is beyond the scope of the RMP and not anticipated or addressed within the ACO. A survey can be added to the recommended actions list to be performed by others at a later date.

- *Provide milestones/timeline for completion of studies and draft report.*

Response: A tentative timeframe for each task can be included in the scope of work.

- *In Task 6 discuss how the two "operating procedures manuals" will be intended to work as one resource management guidebook.*

Response: The overall management plan for Monponsett Pond will be presented in the body of the RMP document. Both – Silver Lake diversion structure and Stump Brook Dam – operating procedures manuals are anticipated to be appendices to the RMP, and will include specific structure details, triggers, actions and standard operating procedures.

- *Task 7: hold the public comment meeting near Monponsett Pond to enable greater attendance from the people most affected by the proposed procedures.*

Response: The ACO requires Brockton to hold one public meeting in advance of finalizing the RMP for submittal to MassDEP. Like the public comment period for the draft scope of work, Brockton is required to provide copies of the RMP for public review and publicly post/advertise the details of the comment period and public meeting. A meeting location has not yet been selected.

- *Consider Alternatives:*

1. *Include a scope for 33 g of the ACO: "Develop a recommended actions list...(including) utilization of alternative procedures and/or technologies..." We would expect that this list will include the development and use by Brockton of the previously proposed "Pleasant Street well" in place of the existing diversion. As a result of the 1995/97 ACO Brockton developed a planned approach to develop and pump the Pleasant Street wellfield in cooperation with the Town of Hanson. This proposal was not implemented by Brockton due to the development of Aquaria. However, it is clear that Brockton needs both Aquaria and its existing sources, as well as more. Use of a groundwater well in the Monponsett watershed, and its use for distribution through the Brockton Treatment Plant could be a life saving alternative to the chronic and destructive manipulation of Monponsett Pond for diversion to Silver Lake. The DEP issued a limited WMA permit to Hanson (File No. 9P- 4-25-044.01) for the use of Pleasant St well (in about 2001) which was later amended. The permit was appealed due to the **additional** stress the use of that well would cause to Monponsett Ponds, because it was not a replacement well but an additional use. However, if a Monponsett RMP is to be part of a full CWMP, then we recommend that the development of upstream groundwater wells, such as Pleasant St, or exploration of alternative sites be considered as optional management strategies that would eliminate the impacts of surface diversions from the pond to Silver Lake with all of the destructive consequences.*

Response: The RMP will include a list of potential action items that could be performed by others, as required by ACO Section 33g. The ACO text notes several measures that could be performed by others including septic system upgrades, stormwater controls, the installation of a control structure and chemical treatment. These action items would be outside of Brockton's jurisdiction for study or implementation, instead to be considered and undertaken by other stakeholders. Development of the Pleasant Street well to replace diversions to Silver Lake is beyond the scope of the RMP.

2. *The SOW should explicitly detail the intentions described in section 33.g regarding "installation of a control structure between East and West Monponsett". The Draft SOW does not mention this but at the public hearing DEP described plans to "put a plug" in the culvert between the lobes of Monponsett Pond. Building more infrastructure that further disrupts the natural connectivity and processes is the WORST way to address the issues at hand. If DEP and Brockton truly intend to take such a disruptive and degrading approach it should at least be described openly and in specific detail rather than hidden.*

Response: As discussed above, due to public comment opposing the idea, the City will no longer consider evaluating whether temporarily sealing the culvert between east and west pond during diversions could have a positive impact on water quality in East and West Monponsett. MassDEP concurs with this decision.

3. *Another alternative is to “plumb” Monponsett Pond directly to the Brockton/Silver Lake Water Filtration Plant. Because of the nutrient rich water quality of Monponsett Pond, that chronically includes invasive species, we recommend that the Monponsett diversion be plumbed directly to the Brockton treatment facility, to avoid discharge into Silver Lake. In this way the amount of water taken from Monponsett each day could be drastically reduced and the overall health of Silver Lake could be allowed to recover, and withdrawal from Silver Lake could be limited. Again the CWMP will have to address these and other issues.*

Response: The means of conveying water from Monponsett Pond directly to the Silver Lake water treatment facility does not exist, would be cost prohibitive to establish, take years to complete (if it could be permitted), and is beyond the management plan for Monponsett Pond itself. Therefore, it is not part of the RMP scope of work.

4. *Expand the Scope of Work to evaluate management strategies that would accommodate water quality concerns and fish migration to and from Monponsett Pond,*

Response: The RMP Scope of Work has been developed to comply with the requirements of the ACO between Brockton and MassDEP regarding management of Brockton’s Chapter 91 Licensed structures on Monponsett Pond only. Stump Brook Dam releases will consider future fish migration (not possible at this time due to downstream limitations). The RMP is not intended to address work beyond Brockton’s jurisdictional authority, other than to list possible action items by others.

Task 2 of the SOW includes “Perform a literature search for reports and/or articles on Monponsett Pond, including documents prepared for/by MassDEP, the towns of Halifax and Hanson, the Monponsett Pond Watershed Association, and the Jones River Watershed Association.” JRWA is glad be included in the list of resources. We look forward to working with CDM and Brockton on this literature search. We have included a preliminary list of recent key documents in this letter.

Response: Thank you for the listed references.

Task 3 of the SOW includes efforts to identify historic pond levels. JRWA is happy to assist with this task and looks forward to being contacted by CDM and Brockton in this regard. We have included a preliminary list of reference materials in this letter.

Response: Thank you for the listed historical references and map.

Jack O'Leary, Chairman, Central Plymouth County Water District (dated 2/24/18)

Introduction from Jack O'Leary

The Central Plymouth County Water District Commission hereby submits comments on the draft Brockton Resource Management Plan, prepared by our consultant, Corona Environmental Consulting. We look forward to working with Brockton, other communities in the District, and interested agencies and groups to solve the complex planning and environmental problems affecting water supply in our District.

The Central Plymouth County Water District Commission was created by the Massachusetts legislature in 1964 specifically to balance the water supply needs of the Brockton Water System with the natural and recreational values of the water bodies supplying the water. We intend to use the authority given to us by the legislature to ensure that this goal is met, would like to work with you and City agencies to ensure that an appropriate management plan is crafted, followed, and amended when necessary to address changing situations.

The Commission has engaged a land surveyor to prepare detailed topographic and detail surveys of specific areas within our jurisdiction. Part of this work will confirm the various elevations called for in the legislation authorizing Brockton's water withdrawals. Once we have these surveys, we will share them with you, as they may be useful to you in your work.

Response: Thank you in advance for sharing information.

Attached comments were provided by Corona Environmental Consultants

The Central Plymouth County Water Management District Commission (the Commission) hereby submits the following comments on the City of Brockton's (the City) Draft Resource Management Plan Scope of Work dated January 24, 2018 (Draft Scope). The Draft Scope addresses the Department of Environmental Protection's (DEP) Administrative Consent Order (ACO) #00001010, Sections 33-34, regarding management of Monponsett Pond diversions in Halifax and Hanson, Massachusetts.

Introduction

Overall, our comments, recommendations and suggestions focus on three areas:

- 1. The need to build upon existing modeling capabilities and datasets to reduce the cost of compliance with the ACO and support an accurate scientific understanding of relevant management options wherever possible,*

Response: The desktop modeling analyses proposed in the RMP will be based on the previous studies, data and modeling performed by others. Direct reuse of previous models will be reviewed but is not planned in part due to the conflicting results and conclusions of the previous studies, lack of correlation between some model predicted and actual recorded conditions.

- 2. Establishing decision making processes that include the full range of involved stakeholders who may have specialized expertise, regulatory authorities and other resources relevant to the requirements of the ACO and integrated management of Brockton's water system, and*

Response: The RMP will be conducted by CDM Smith staff who have specialized expertise in water resource management and water quality issues like Monponsett Pond's. Periodic meetings with MassDEP and other regulatory authorities, as jurisdiction dictates, will provide the necessary regulatory oversight/input. Specific stakeholder inputs have been noted in the scope of work. An advisory committee is not planned; however, another comment period and public meeting will be included for review of the final RMP before it is submitted to MassDEP for review and approval.

- 3. Development of a comprehensive monitoring and data sharing plan that will support informed decision-making and a better understanding of the relationships between water quality, water quantity, and weather patterns affecting the full set of resources that are part of Brockton's water supply system (i.e., East and West Monponsett Pond, Silver Lake, Furnace Pond, Stump Brook, Jones River and local groundwater systems).*

Response: The RMP addresses management of Monponsett Pond only. The RMP document in its entirety will be shared during the public comment period. Interim release of partial results could create the potential for public misunderstanding of incomplete analyses and would be counterproductive.

We recognize that some of our comments exceed the scope and authority of the current Draft Scope, which was produced to satisfy the requirements of the February 2017 ACO. However, the Commission in its exercising its oversight role for the Brockton water supply system would be remiss if we did not suggest opportunities to refine this scope of work to better support and dovetail into the longterm integrated water resource management needs of the City.

Detailed Comments

Task 1. Project Scoping and Regulatory Coordination

- 1. This task outlines the City's process to develop the Draft Scope. We support the inclusion of responses to comments received and offer our assistance in working with the City to discuss our recommendations and the City's response to them as the final draft is being prepared.*

Response: Thank you.

Task 2. Document Target Pond Water Levels.

- 2. The title of this task does not fully reflect the intent of the section of the ACO that it addresses (33a), which goes beyond data documentation. We recommend changing the title to better reflect the ACO language, such as "Establish Stump Brook Dam Operating Procedures and Metrics".*

Response: This Task goes beyond Stump Brook Dam procedures and metrics as well. This task was developed to look at the range of pond water levels necessary to could support the various pond uses over the course of the year. Goals and metrics for pond level, and dam and diversion operations would then be developed for overall pond management.

3. *The second paragraph indicates that the goal of this section of the Draft Scope is to "...develop monthly target pond elevations to accommodate existing uses". We note that some of the uses described in the ACO may not be considered "Existing uses" due to the impaired nature of the waterbodies in question (e.g., limitations on recreation due to algal blooms and lack of migratory fish passage). We recommend replacing "existing uses" with the bulleted list of needs in section 33a of the ACO.*

Response: We will include a list of uses to be reviewed.

4. *The first bullet of the Detailed Scope of Work for Task 2 should also include a summary of historical fish ladder and diversion structure settings.*

Response: Yes, these would be summarized.

5. *The third bullet should include consultation with the DEP and Halifax Board of Health regarding bathing uses.*

Response: We will consult with MassDPH and the Halifax Board of Health regarding bathing uses. MassDEP is not responsible for bathing standards or restrictions.

6. *The fourth bullet should include information collection for habitat requirements for listed species in Silver Lake, which may receive nutrient- and algae-rich diversions from Monponsett Pond during certain seasons.*

Response: Silver Lake is beyond the scope of this RMP.

7. *The sixth bullet should include solicitation of input from the Cape Cod Cranberry Growers' Association (see <http://www.cranberries.org>), which serves cranberry growers across Massachusetts, in addition to the University of Massachusetts regarding cranberry agriculture management. Cranberry growers in or discharging to the Monponsett Pond watershed should also be consulted and kept informed of this process.*

Response: We will consult the Cape Cod Cranberry Growers' Association (CCCGA) and UMass Cranberry Station. The CCCGA operates as an advocacy and information resource for the cranberry industry. The UMass Cranberry station offers nutrient management information through the biennial (formerly annual) Chart Book, BMPs and other information. If feasible, RMP consider increasing flow from through the Stump Brook Dam when growers are discharging agricultural return flows to White Oak Brook.

MassDEP and the City have met with Morse Brothers Inc. and found that only a small portion of the Winebrook bogs drain agricultural return flows into Monponsett Pond. MassDEP is working with current bog operators to ensure compliance with its regulations,

including implementation of BMPs and notification of discharges. Brockton will work with MassDEP to better understand the agricultural uses but has no jurisdictional authority to control land uses within the Monponsett Pond watershed.

8. *The seventh bullet should include collection of precipitation data in addition to pond and groundwater elevations to facilitate a better understanding of the effects of diversions on water levels.*

Response: Collection of precipitation, groundwater and streamflow data from sources including United States Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS), and Massachusetts Department of Conservation and Recreation (DCR) are planned, as available. Pond level data is collected daily by the City.

9. *The eighth bullet, regarding a literature search, does not specify what type of information is sought. Search terms should be listed that will guide the literature search, and could include terms such as: water quality, algal blooms, nutrients, flooding, diversions of water, fish kills or other aquatic species events, cranberry cultivation, stormwater, etc. Note that we are appending our own list of related references to our comment letter to assist in this effort and are happy to provide copies of any documents on this list if needed.*

Response: Thank you for the information provided.

10. *The ninth bullet indicates that the City intends to evaluate possible changes to operating procedures in-house. In our reading, this suggests that existing models developed by hydrologists to provide capabilities specifically suited to answer these questions will not be used. We suggest that the City convene a Scientific Advisory Committee to evaluate the strengths and accuracy of existing models and scenarios and offer guidance in building upon these models and capabilities to incorporate new data and answer any remaining questions using the existing models if possible. We draw the City's attention especially to the groundwater, surface water and water quality models completed by Horsley Witten in 2015-16 (Horsley Witten Group, Inc., 2015; Horsley Witten group, Inc., 2016), the United States Environmental Protection Agency's (EPA) Watershed Management Optimization Support Tool (WMOST) developed by Naomi Dettenbeck (Dettenbeck 2014) and the Lake Loading Response Model (LLRM) developed by the MA DEP for the Monponsett Ponds Draft Total Maximum Daily Load report (TMDL) (2016). Each of these models was developed and exercised to answer very similar questions to those being asked in the ACO. We note in particular that Section 33 of the ACO directs the City to prepare a resource management plan "...based on scientific data and evaluation...". These models represent the best available science and should be used to assess the impact of alternative diversion scenarios on Monponsett Pond water levels, flushing, water quality, habitat availability and Stump Brook flows and fish passage. We also note that these models could, at the same time, assess effects on Silver Lake and Jones River water levels, water quality, habitat availability, flows and fish passage which must also be considerations in an integrated approach to the City's water management procedures.*

We note that the City's is already moving in this direction to some extent. In 2017, the City relied more heavily on use of Aquaria's desalinated water than in the past. We presume that these decisions were made at least partly based on the previously developed models and subsequent discussions. This process should be formalized through the development of a Scientific Advisory Committee to help guide adaptive management of the overall system as new information is obtained, new operating practices are tested and to respond to new situations on the ground as they change.

Response: The RMP will be conducted by qualified CDM Smith staff who have specialized expertise in water resource management, water quality issues like Monponsett Pond's, and modeling. Specific stakeholder inputs have been noted in the scope of work. An advisory committee is not planned; however, another comment period and public meeting will be included for review of the final RMP before it is submitted to MassDEP for review and approval.

The desktop modeling analyses proposed in the RMP will be based on the previous studies and modeling performed by others, including the Watershed Management Optimization Support Tool (WMOST) and Lake Loading Response Model (LLRM). Reuse of previous models is not proposed in part due to their focus on land use/watershed loads, conflicting results and conclusions of the previous studies, lack of correlation between some model predicted and actual recorded conditions. A water balance/flow routing analysis is planned. Brockton has no jurisdictional authority to control land uses within the Monponsett Pond watershed.

- 11. Regarding the types of questions to be answered in this endeavor, we note that minimizing flow between West and East Monponsett Ponds is likely to cause algal cell counts in West Monponsett Pond to reach health-based thresholds earlier in the season, arguably causing antidegradation issues under the Clean Water Act.*

Response: The flow pattern within the pond is one of many issues related to the pond's cyanobacteria issues. Land uses, including residential development and agriculture, and other sources also contribute to the issues facing the pond.

- 12. We also suggest that the fish migration bullet (second-to-last bullet on page 3) should be expanded from "support fish migration in Stump Brook" to "support fish migration from Stump Brook into and out of Monponsett Pond and from the Jones River into and out of Silver Lake", as water levels, and thus fish ladder functionality, in both bodies of water are affected by the City's diversions licensed under Chapter 91.*

Response: The RMP will address fish migration to/from Stump Brook from/to Monponsett Pond only.

- 13. Finally, the last bullet under Task 2 states that the City will develop target pond elevations, presumably to guide management of Stump Brook flows and diversions to Silver Lake. The objective of this effort is not clear and should be spelled out in the final Scope of Work. In addition, as single values, targets are not reliably achievable given natural environmental*

variability. The plan should include a decision tree or alternative action to be taken when target pond elevations are not met, either due to natural drought (or flood) conditions or recent diversion activity. We recommend using the Scientific Advisory Committee suggested above to also help craft scientifically-based and defensible target levels and alternative actions. This level of stakeholder involvement is particularly important for this task, as these decisions affect a number of other strongly held stakeholder values (recreation, fisheries, listed species, etc.). An inclusive process here may help to establish a common understanding of the data and decision-making process and a shared vision for water resource management in the region.

Target pond levels are related to cyanobacteria counts and species in multiple and complex ways. Studies on other lakes, reservoirs and ponds have shown that lower water levels are associated with increased production of certain cyanobacteria, including those associated with taste and odor compound production and cyanotoxin production. Pond levels are also related to residence times, mixing, and other factors associated with growth or suppression of cyanobacteria. Once target pond levels are developed, scientific studies documenting the impact of pond levels on cyanobacteria and cyanotoxins are required to validate the target pond levels and to reduce the likelihood of unintended consequences related to the management strategy. The USGS and other have conducted similar studies for other impacted water bodies. For example, Mau et al.(2004) conducted a study to understand the connection between water management and nutrient loading and the occurrence of key cyanobacterial species. Systematic evaluation allowed Mau and co-authors to understand the seasonality in ecology of a reservoir and a key influent stream and identify key factors related to cyanobacterial proliferation.

Minimum elements of a scientific evaluation of the pond level strategy are (i) phytoplankton monitoring, inclusive of counts or biomass by species, at multiple locations, multiple depths and over all seasons, (ii) cyanotoxin monitoring, (iii) concurrent water quality monitoring for nutrients (particularly ammonia and nitrate nitrogen and total phosphorus, (iv) clarity monitoring (Secchi depth, turbidity, suspended solids or a related measure), and (v) measurement of other water quality parameters (temperature, pH, dissolved oxygen and conductivity). Other data that have been collected in prior similar studies include fluorescence measurement of chlorophyll and phycocyanin and the taste and odor compounds geosmin and 2-MIB (often associated with cyanobacteria). Those data will allow documentation of the impact of pond level management as well as an opportunity to better understand the ecology of the ponds and management strategies that target it.

Response: The target pond elevations, or elevation ranges, will be used to develop a series of triggers and actions that will guide Stump Brook releases and Silver Lake diversions. These will include drought and flood, as well as water quality considerations. MassDEP has planned water quality testing in 2018. The RMP will be conducted by qualified CDM Smith staff who have specialized expertise in water resource management, and water quality issues like Monponsett Pond's. Specific stakeholder inputs have been noted in the scope of work. An advisory committee is not planned. However, in developing proposed target pond elevations, the City plans to reach out to governmental agencies for feedback. The purpose

of the targeted pond elevations is twofold: 1) inform Stump Brook Dam and Diversion Structure operations to best provide levels in the pond to support boating, bathing agriculture, and water supply; and 2) provide for better informed decision-making when pond levels, precipitation, etc., can provide opportunities to manipulate operations to potentially increase flushing when it can have the highest likelihood of improving water quality while not impacting adequacy of water to meet water supply, boating, bathing, and agricultural needs.

Task 3. Research Historical Pond Elevations

14. *Task 3 details how the City will collect historical pond level data. One additional potential resource is the University of New Hampshire's online historic map collection, which includes many older topographic maps that indicate the aerial extent of various water bodies in question: <http://docs.unh.edu/nhtopos/nhtopos.htm> The University of Massachusetts at Lowell also offers an online topographical atlas from 1884-1890: <http://library.uml.edu/clh/Atlas/1884/In.htm>*

Response: Thank you for the information provided.

Task 4. Collect Flow Data at the Route 58 Box Culvert

15. *Task 4 addresses ACO item 33c, regarding flow between East and West Monponsett Ponds. The approach outlined relies on outdated measurement methods and data management protocols, and we recommend establishing a more robust water quality and velocity monitoring program as part of the resource management plan that would dovetail with the larger monitoring needs for integrated management of Brockton's water supply system.*

To date, water quality and quantity measurements in Brockton's water system have been completed for single study or single purpose efforts by a variety of organizations (e.g., water quality measurements associated with alum applications in Monponsett Pond, algal cell counts related to recreational contact restrictions in the ponds, stream flow measurements in the Jones River focused on fish passage needs, water stage and diversion volumes recorded by Brockton for regulatory record-keeping). We submit that it is time for the City to develop a comprehensive approach to monitoring these water resources, and the development of the final Resource Management Plan presents an opportunity to begin this process. A longterm record of daily or sub-daily readings will provide a better understanding of the relationship between water movement and water quality and allow better calibration of existing decision support models to assess operational changes as well as the potential to develop predictive models (e.g., to predict algal population changes).

We recommend that the Final Scope of Work include the development of a comprehensive water quality and velocity monitoring program to establish this critical baseline data. The water quality monitoring program should address both the flow rates and directions of water movement in the system (including diversions as well as natural outlet flows) as well as the basic water quality parameters associated with existing impairments, such as total phosphorous, Secchi depth, turbidity, dissolved oxygen, temperature (including changes at

depth indicative of pond stratification and the timing of pond turnover) and algal counts and speciation. As suggested previously, a Science Advisory Committee would be helpful in providing guidance on methodologies, funding sources and access to other stakeholders who may be willing to participate in an integrated approach to water quality monitoring across all the water resources affected by Brockton's system. We note that the recent installation of remote operating equipment at the Stump Brook dam is a first step in this direction, particularly if water stage and operational change data are being recorded.

Response: In this case, simple flow estimating procedures are best suited to this location. The shallow flow characteristics in the culvert, pond bathymetry, as well as wind and human interference, all make more scientific measurements difficult and unreliable. Brockton does keep long-term records of reservoir elevations, diversions and withdrawals. The CWMP Update will look at overall system management.

The primary goal of the flow evaluation is to better understand the relationship between pond elevation and flow patterns, based on Stump Brook Dam release rates and Silver Lake diversion withdrawal rates. While undocumented, there has been a concern regarding the potential for reversals in the natural flow regime (from west pond to east pond) during Silver Lake diversions. The assumption here is that water quality is best protected if the natural flow regime can be maintained – from east pond to west pond to Stump Brook. Better understanding the pond flow dynamics under varying conditions, will enable informed decision-making to reduce the potential for reversals in flow during diversionary periods.

MassDEP plans to perform a water quality survey of Monponsett Pond between June and September 2018. Parameters include: cyanobacteria and phytoplankton, algal toxins, nutrients (total phosphorus, total nitrogen, ammonia, color and turbidity), secchi depth, chlorophyll a, dissolved oxygen, temperature, pH, and conductivity. Brockton will also perform water quality testing of grab sampling for nutrients, dissolved oxygen, temperature, pH, and conductivity during up to four selected flow release/diversion scenarios in Task 4.

16. *More specifically, with regard to the measurement of water movement between the ponds as described in Task 4, we recommend using a standard velocity measurement instrument rather than an orange to gain a more accurate understanding of the movement of water beneath the surface. Typical modern instrumentation could include a standard propeller current meter, electromagnetic or doppler device. While older models of current meters did not excel in low flow or fouling conditions, as might be expected in the Monponsett Pond culvert, newer models are made specifically for these conditions and these submerged technologies would not be affected by surface wind and wave action, as would the low-tech approach outlined in the Draft Scope. Newer instruments can also be configured to collect and store data at regular intervals, providing a longterm record of water movement and direction between the ponds before, during and after diversion periods rather than a snapshot of several moments during diversions. We note that many of these instruments can also provide water stage (depth) and/or other relevant water quality data, such as temperature, conductivity and turbidity,*

that would also help to provide a better understanding of the relationship between water movement and water quality in this system.

Response: In this case, simple flow estimating procedures appear to be best suited to this location. The pond and culvert characteristics, as well as wind and human interference, all make more scientific measurements unreliable. The isolated location would also expose the instrument(s) to vandalism or theft. Additional consideration will be given to different measurement methods with MassDEP prior to completing this task.

- 17. The Draft Scope outlines an approach where “several measurements during each season” are taken under a variety of diversion rates, allowing for a two-day adjustment period before taking the measurements. The approach of evaluating multiple diversion rates is sound, however the infrequent data collection effort will limit the understanding of how changes in operations and weather conditions affect flow between the ponds. A daily or sub-daily measurement frequency is needed beginning before the change in diversion rate and continuing past the end of the set diversion rate. Ideally, a continuous year-round daily dataset would be produced using appropriate modern instrumentation as part of the comprehensive water quality monitoring program. Local precipitation should also be collected at a similar time step to help evaluate the effect of precipitation on stage and flow between the ponds as well as water quality in the ponds.*

Response: In this case, simple flow estimating procedures appear to be best suited to this location. The pond and culvert characteristics, as well as wind and human interference, all make more scientific measurements unreliable. The isolated location would also expose the instrument(s) to tampering, vandalism or theft. Additional consideration will be given to different measurement methods with MassDEP prior to completing this task. MassDEP plans to perform water quality testing in 2018. Precipitation, groundwater and streamflow data from existing local gauges will be collected.

Task 5. Estimate Variable Seasonal Releases to Stump Brook

- 18. Task 5 addresses item 33d in the ACO regarding an evaluation of the effect of diversion strategies on flushing rates in West Monponsett Pond. Similar to our comments on Task 2, the Draft Scope outlines an approach to develop a “qualitative assessment” in-house rather than relying on existing models that may be able to answer this question more robustly and cost-effectively. We draw the City’s attention in particular to the Lake Loading Response Models (LLRM) already developed by the DEP as part of the Total Maximum Daily Load effort (MA DEP, 2016) and the Horsley-Witten report (2015). Many of the steps outlined in the Draft Scope were already taken for these modeling efforts. With input from the previously recommended Science Advisory Committee, an evaluation of the adequacy of this existing model to assess the effect of diversions on flushing and water quality in each pond could be made and any changes to model assumptions or scenarios identified to develop a complete answer to the question more quickly and efficiently than an in-house assessment starting from ground zero.*

Response: The desktop modeling analyses proposed in the RMP will be based on the previous studies and modeling performed by others, including the Watershed Management Optimization Support Tool (WMOST) and Lake Loading Response Model (LLRM). Reuse of previous models is not proposed in part due to their focus on land use/watershed loads, conflicting results and conclusions of the previous studies, lack of correlation between some model predicted and actual recorded conditions. A water balance/flow routing analysis is planned.

It is important to remember that Brockton has no jurisdiction to control watershed loads. It only has control over its water supply diversions and releases to Stump Brook.

19. Several of the other questions raised in the Draft Scope are right on target and should be addressed with the input of hydrologists familiar with past modeling efforts as part of a Science Advisory Committee. These include the question of groundwater infiltration, which was addressed in all the models to date but not with great accuracy (i.e., the models in general overestimate Silver Lake drawdown by up to several feet due to water withdrawals and diversions indicating a likely mischaracterization of groundwater inputs). The other topic raised in the Draft Scope that would benefit from input from a Science Advisory Committee is the effect of pond stratification and turnover on water quality during diversion periods. A targeted monitoring program could help to better understand the vertical mixing dynamics in East and West Monponsett Pond and their effect on seasonal phosphorous availability and algal blooms. Existing models may be able to be expanded to identify opportunities to adjust the timing and volume of Brockton's water diversions to minimize their impact on the likelihood of harmful algal blooms, assuming appropriate baseline data collection is undertaken first.

Response: The RMP will be conducted by qualified CDM Smith staff who have specialized expertise in water resource management, water quality issues like Monponsett Pond's, hydrology, and modeling. Specific stakeholder inputs have been noted in the scope of work. An advisory committee is not planned.

Task 6. Operating Procedures for Silver Lake Diversion & Stump Brook Dam

20. This Task addresses ACO items 33e and 33f requiring the development of operational plans for the Stump Brook Dam and Silver Lake diversion from Monponsett Pond. The Draft Scope does not explicitly address the potential role of alternative sources and demand management in alleviating environmental impacts. We recommend that the City commit to evaluating options such as the use of the Aquaria desalination plant and possible connection to the Massachusetts Water Resources Authority (MWRA) system as well as demand management measures, including implementation of outdoor watering restrictions, as part of the process of evaluating operational strategies and developing operating manuals for the diversion and Stump Brook releases. The availability of these alternative sources has a direct impact on the ability of the City to minimize its environmental and public health impacts related to diversions of water under its Chapter 91 license and thus should appropriately be addressed in this Resource Management Plan.

Response: This RMP is for Monponsett Pond only. The subsequent CWMP Update, that is also required under the ACO, will review overall system management, including alternative sources and demand management.

21. We also recommend that this section also include the development of standard data collection, record-keeping and data quality assurance protocols to clearly support and document the operational decisions that will be made based on the data and operating procedures outlined in the manuals.

Response: Data acquisition as it pertains to operations of the dam and diversion structures will be included.

Task 7. Draft Report Preparation and Public Comment

22. This task outlines procedures for producing the draft and final reports and addressing public comments received. We recommend that a timeline be included for these tasks based on the dates detailed in the ACO. Once again, we offer our assistance in working with the City to discuss the public comments and the City's response to them as the final draft is being prepared.

Response: A tentative timeframe for each task can be included in the scope of work. A 30-day minimum public comment period will be accommodated within the time allotted for RMP preparation. The partial release of results, in advance of the comment period, could create the potential for public misunderstanding of incomplete analyses and would be counterproductive.

Additional Considerations

23. Work associated with ACO item 33g regarding the development of a list of recommended actions that could be performed by others to improve Monponsett Pond water quality appears to be missing from the Draft Scope. A scope of work for this item should be included and should address the main sources of nutrient inputs identified in the Draft TMDL for East and West Monponsett Ponds (2017). We recommend inclusion of a Science Advisory Committee to provide input on possible stakeholder actions that could contribute to water quality improvements, possible funding sources for them and the development of a water quality monitoring plan to track water quality improvements over time.

Data cited in the draft TMDL document (MassDEP, 2016) and other modeling efforts (Horsley-Witten Group, 2015) indicate that internal cycling and agricultural inputs are the main sources of phosphorous loading to the Monponsett ponds, contributing to conditions ripe for harmful algal blooms in West Monponsett Pond. The DEP conducted benthic flux experiments that support the internal loading conclusion (MassDEP 2016). However, we have not seen any water quality data confirming the agricultural loading estimates. We recommend that one action to be taken by others under the ACO's item 33g is work with the cranberry growers to understand the timing of withdrawals and discharges to the Monponsett Pond system coupled with targeted phosphorous sampling to confirm or refine the estimates of nutrient loading due

to agricultural impacts. These data would substantiate any future funding requests to tackle nutrient loading reductions from agricultural sources. This type of work could be coordinated through the Scientific Advisory Committee previously recommended.

Response: The RMP will include a list of potential action items that could be performed by others, as required by ACO Section 33g. The ACO text notes several measures that could be performed by others including septic system upgrades, stormwater controls, the installation of a control structure and chemical treatment. Many action items have been noted in previous studies and MassDEP's *Draft West and East Monponsett Pond System Total Maximum Daily Loads for Total Phosphorus (CN# 446.0)*. Additional recommended action items would be welcome during the public comment period. These action items would be outside of Brockton's jurisdiction for detailed study or implementation.

24. *We note that if there are opportunities to reduce nutrient loading to the Monponsett Ponds through changes to agricultural operations (e.g., cranberry farms), one source of potential funding the City could consider is the Farm Bill. The American Water Works Association (AWWA) has been working with legislators on suggested changes to the Farm Bill that appear to have bipartisan support. If/when the Bill passes for 2018, this would set aside 10% of related conservation funding for projects tied to drinking water source protection. The AWWA is currently looking to help utilities who are prepared to partner with agricultural operations take advantage of this (likely) upcoming funding source over the next year or two and we would be happy to put the City in touch with the appropriate personnel if an appropriate project is identified.*

Response: Brockton is not responsible for nutrient inputs into the Monponsett Pond system. Brockton has no jurisdiction over land uses in Halifax and Hanson. Brockton is undertaking an effort seeking positive steps it could take to improve the flow regime within the pond and to reduce the impact of its water withdrawals on the Monponsett system. Partnering and combining efforts to better manage flow with efforts to reduce nutrient inputs offers the best opportunity for improved water quality. The Town of Halifax – assisted by partial grant funding from MassDEP and EPA, and local share participation by the City of Brockton – has invested significant effort in nutrient stabilization through alum treatments of Monponsett Pond. Increased effort to reduce nutrient additions is called for by the MassDEP's TMDL and is identified as a necessary step to further help to improve water quality. This would need to be brought to the attention of appropriate entities in a controlling position, such as the Towns of Hanson and Halifax and area cranberry growers. These issues would be included in the action items list, as required by ACO Section 33g.

25. *The SOW does not fully connect water resources management to cyanobacterial abundance or impacts and does not mention additional activities that could be evaluated as alternatives to or complements to water resources management. In addition to managing residence time and pond level, alum treatments for reducing phosphorus concentration have been conducted. If alum treatments are continued, comprehensive assessments of the impacts of the treatments should be conducted. Prior studies have documented decreased cyanobacterial biomass, but increased cyanotoxin production under phosphorus limiting conditions. Although reducing*

growth through phosphorus reduction (whether through alum treatments or other means) is a reasonable approach, monitoring and assessment to catch unintended consequences is prudent. Other strategies that have been explored for cyanobacteria management include mixing, chemical treatments (e.g., targeted application of copper compounds, largescale application of hydrogen peroxide) and ultrasonic (nonchemical) control. As noted elsewhere, choice and application of effective control strategies can only be done in light of a nuanced understanding of the cyanobacteria ecology and, when implemented, should be done in conjunction with monitoring to validate that controls are achieving their target outcomes and not producing unintended consequences.

Response: Alum treatments and other water quality controls to manage land use impacts are beyond Brockton's jurisdictional authority and the responsibility of others. Treatments would be considered part of the action items list by others required by ACO Section 33g.

Beth Lambert, Director, MA Department of Fish and Game, Division of Ecological Restoration (via email 2/26/18)

The Division of Ecological Restoration (DER) in the Department of Fish and Game (DFG) has designated Monponsett Ponds/Stump Brook as well as Silver Lake/Jones River as Streamflow Restoration Priority Projects. DER has also funded several studies to evaluate the hydrology, water management, and water quality in these systems, which address many of the issues detailed in the draft Scope of Work (SOW) for the Resource Management Plan. DER requests that the City's development of the Resource Management Plan include reviewing these studies and incorporating their findings into the Plan. The reports of these DER-funded studies are available on-line at the following locations:

- *Stump Brook/Monponsett Pond Hydrologic and Water Quality Assessment (http://www.town.halifax.ma.us/pages/HalifaxMA_Webdocs/stumpbrookflowfullreport.pdf)*
- *Assessment of Tri-basin Area Water Management Alternatives and Simulated Impacts to Silver Lake and the Jones River, Southeastern Massachusetts (http://jonesriver.org/getfile/project-reports/2016Jun30_HWG_JonesRiverReportFinal.pdf)*

Response: Thank you for the above references. They will be reviewed as part of preparation of the RMP.

In addition, DER offers the following comments and recommendations on the draft SOW for the Resource Management Plan:

Task 2 – Document Target Pond Water Levels

In addition to the listed potential changes to operating procedures, also include:

- *Support natural streamflow in Stump Brook to provide fish passage and support downstream aquatic habitat, including Atlantic White Cedar and Red Maple Swamps.*

Response: Detailed investigations of site-specific streamflow and habitat requirements for Stump Brook and the Atlantic White Cedar and Red Maple Swamps are not planned. Releases of 900,000 gpd are assumed to support fish migration.

Task 4 – Collect Flow Data at the Route 58 Boxculvert

Add data collection for the following conditions which would support a better understanding of management options:

- *25 percent diversion rate to Silver Lake with at least 900,000 gpd release to Stump Brook*
- *Include testing the opening of the sluice gate at the Stump Pond dam, in various increments, to release flows downstream. This should, at a minimum, be included in the flood control/pond flushing scenarios as well as the Full Diversion scenario.*

Response: We will consider these flow scenarios.

Task 5 – Estimate Variable Seasonal Releases to Stump Brook

The Scope of Work for this task should also evaluate the ability of Stump Brook dam to release flood flows via sluice gate, fish ladder, spillway and any potential impacts to downstream resources and infrastructure.

Response: The Stump Brook Dam structure was designed to release flood flows via the sluice gate, fish ladder and spillway. If a substantial flushing flow is considered beneficial, the potential impacts to downstream resources and infrastructure will be reviewed.

Task 7 – Draft Report Preparation and Public Comment

Finally, DER requests that the draft Resource Management Plan also address the following matters:

- *Recommendations for any changes to existing infrastructure (e.g., Stump Pond dam outlet structures, culvert, diversion structure) that would facilitate management of the Monponsett Pond/Silver Lake/Stump Brook system.*
- *A recommended actions list with a preliminary feasibility assessment, as described in Administrative Consent Order, Item 33g.*
- *An evaluation of potential impacts to Silver Lake/Jones River ecosystem based on operating procedures determined as part of Task 6.*

Response: No specific modifications to infrastructure are envisioned but would be included if recommended. A list of action items by others will be added, as required by ACO Section 33g. The Silver Lake/Jones River ecosystem is not part of the RMP scope of work.

Thank you again for the opportunity to comment on the draft SOW for the Resource Management Plan. If you have questions on the work that DER has completed on Monponsett

Pond, Stump Brook, and Silver Lake, please contact Michelle Craddock at michelle.craddock@state.ma.us or 617-626-1544.

Paul Collis, President and Marianne Moore, Executive Secretary, Monponsett Watershed Association (via e-mail 2/16/18)

Comments

- *The wording throughout is vague and passive. There should be a timeline with specific target dates for each task and more concrete action items.*

Response: A tentative timeframe for each task will be included in the scope of work. Some tasks will be completed within a short timeframe; others will take some time. The final scope of work will include more definitive wording and goals.

- *Please consider holding the next public meeting on this RMP in Halifax to make it easier for Halifax residents who may be affected by this plan to attend.*

Response: The meeting location will be selected as part of the meeting preparations.

- *Section 33 requires coordination of the cranberry harvest discharge and Brockton opening the fish ladder gate and the SLUICEWAY. There is no mention of this requirement in the RMP.*

Response: MassDEP and the City have met with Morse Brothers Inc. and found that only a small portion of the Winebrook bogs drain agricultural return flows into Monponsett Pond. MassDEP is working with the bog owners regarding BMPs and notification of discharges. Brockton will work with MassDEP to get a better understanding of agricultural uses and discharges but has no jurisdictional authority to control land uses within the Monponsett Pond watershed.

- *Task 4*

- *While there is no mention of control works at the Route 58 culvert the entire Task 4 is devoted to studying water in the culvert. The ACO in section 33 subsection G devotes less than a sentence to controlling the flow in the culvert.*
- *At the February 6th public meeting it was stated that a 'temporary plug' would be placed in the Route 58 culvert. Whatever this is, it should be clearly and specifically described in the SOW. It is difficult to offer pertinent comments when the description is so unclear.*
- *There is phrase that "It is understood" that there is no flow through Stump Brook when there is no diversion to Silver Lake. It is unclear what that means but it might cause West Pond to be a stagnant Pond.*

Response: The Draft RMP scope of work proposed the possibility of evaluating a temporary barrier between east and west ponds. The hypothesis to be tested was that such a barrier could both protect the east pond during cyanobacteria blooms and could also be beneficial as part of a west pond flushing scenario by impounding the east pond and then sending a flush of water into/through west pond. There was no intent to further degrade west pond. In

response to the public comment received in opposition to the evaluation of a temporary barrier between east and west pond, the City will not investigate the temporary barrier. MassDEP concurs with this decision.

E. Heidi Richie, Senior Policy Analyst, Massachusetts Audubon Society (via e-mail 2/26/18)

[Note: text directly related to Monponsett Pond and the RMP are provided below. A complete copy of the comment letter is appended to this document.]

On behalf of Mass Audubon, I submit the following comments on the City of Brockton's draft Scope of Work (SOW) for a Resource Management Plan (RMP) for management of the Monponsett Pond portion of Brockton's water supply, including operation of the Stump Brook Dam and diversions of water to Silver Lake. The City's Comprehensive Water Management Plan (CWMP), of which this RMP is only one part, needs to address management of all parts of Brockton's water system to minimize environmental impacts in three watersheds (Taunton, Jones, North River).

Response: This RMP scope of work related to Monponsett Pond management only. The subsequent CWMP Update will address overall system management.

Mass Audubon has a longstanding and direct interest in the condition and management of Monponsett Pond and associated water resources. Mass Audubon's 250-acre Stump Brook Wildlife Sanctuary borders Stump Brook and contains extensive wetlands including Atlantic White Cedar swamp, a globally and regionally threatened natural community. Flow to the brook is regulated by the Stump Brook Dam on Monponsett Pond, owned and operated by Brockton. Water quality in the pond and the flow or lack thereof across the dam affects the ecological health of Stump Brook and associated fisheries and wetlands. Approximately 70 percent of the natural flow to Stump Brook is diverted annually to Silver Lake. The sanctuary is Priority Habitat for six rare species protected under the Massachusetts Endangered Species Act, including two species classified as threatened. The extensive wetlands on the sanctuary are a remnant of a more extensive wetland complex historically altered by local cranberry cultivation. Stump Brook also borders on and is connected to wetland resources and lands conserved by MassWildlife at the adjacent Burrage Pond Wildlife Management Area. All of these resources are sensitive to alterations in hydrology and habitat degradation from disturbance. Brockton's other water supply sources, including Silver Lake and Furnace Pond, also support important fish and wildlife resources and are impacted by Brockton's water management practices. The Jones River suffers frequent and lengthy periods of no-flow. Restoration of anadromous fisheries is underway in all three watersheds, with significant investments in dam removals and other ecosystem restoration projects. Brockton's water management practices need to support these fisheries, including avoidance of entrapment of juvenile herring within waterbodies due to lack of outlets and inadequate flows, and must ensure essential migration to the ocean.

Response: Brockton will review water level, flow and other requirements necessary to support the many uses of Monponsett Pond. The study area does not extend downstream of Stump Brook dam or to Silver Lake and the Jones River. The requested studies could be included on the actions list for others.

The final SOW for the RMP should fully and clearly enumerate all of the applicable laws, regulations, permits, licenses, and ACOs applicable to Brockton's water supply system, in order to ensure that the

RMP and CWMP are firmly founded in and developed around the applicable jurisdictional framework. This jurisdictional introduction and the CWMP must address all of Brockton's water supply sources.

Response: The applicable regulations, permits, etc., as they pertain to Monponsett Pond will be included in the RMP.

The 2017 ACO only provides for public review and comment on the RMP, with the CWMP to be reviewed only by DEP. Because the two documents are closely intertwined and there is a compelling public interest in ensuring that the overall system is optimally managed, Mass Audubon respectfully requests that DEP provide for public review on the SOW for the CWMP and on the draft CWMP. In any case, the RMP needs to include information on all parts of the water supply system and associated jurisdictional framework in order to provide the proper context for planning for management of Monponsett Pond and the Silver Lake diversion.

Response: Formal public review of the CWMP Update is not required by the ACO. However, stakeholders will have an opportunity to comment on this document during MassDEP's review process.

Mass Audubon is committed to working cooperatively with all of the interested parties and regulatory agencies toward improved management of all of the water resources affected by Brockton's water supply system.