



MEMORANDUM

To: Chris Miller, Natural Resource Director
Ryan Bennett, Town Planner

From: Mark Nelson, Jane Estey

Date: December 31, 2018

Re: Implementation of an Onsite Septic System Treatment Program for the Pleasant Bay Watershed

The Horsley Witten Group, Inc. (HW) has evaluated Brewster's requirements and options for the implementation of a program to install, operate and monitor advanced onsite septic systems for nitrogen removal within the Pleasant Bay watershed. The goal of this program is to remove the remaining nitrogen from sources within the watershed to meet the Total Maximum Daily Load for Brewster's portion of the Pleasant Bay Watershed.

This report has been prepared to identify the issues involved in establishing the program and to provide some initial recommendations on how to move forward. It is anticipated that the implementation process will be refined over the next year with significant input from the Select Board, the Board of Health and town residents. Funding for this project was provided by the Department of Housing and Community Development's District Local Technical Assistance program through the Cape Cod Commission.

Background

Pleasant Bay is impacted by excessive nitrogen coming from sources within its watershed; that area which contributes groundwater to the Bay. Septic system discharges are the largest source of nitrogen in the watershed, followed by fertilizers, road runoff and agricultural sources. Approximately 25 percent of the Pleasant Bay watershed is located within Brewster, with the remaining watershed areas in Orleans, Harwich and Chatham (Pleasant Bay Alliance, May 2018).

The Massachusetts Department of Environmental Protection (MassDEP) has established a TMDL for the Bay (Mass DEP, May 2007) based on a model developed by the University of Massachusetts School for Marine Science & Technology (SMASST, May, 2006). Based on this information, Brewster has partnered with the other towns within the watershed to develop a Targeted Watershed Management Plan to restore Pleasant Bay. The plan is the foundation for the watershed permit between the four Pleasant Bay towns and the MassDEP issued in August, 2018 to manage the towns' actions to achieve TMDL compliance for Pleasant Bay over the next 20 years. The permit identifies the steps each town will take to meet the TMDL over the next 20 years and allows them to utilize non-traditional options for nitrogen removal, like the onsite systems proposed for Brewster.

Under the watershed permit, Brewster has agreed to remove 2,262 kg/year of nitrogen to meet its TMDL requirements. To date 56 percent of this load reduction has been achieved through

reductions in fertilizer use and through the recapture of nitrogen through the irrigation well at the town-owned Captains Golf Course (Table 1). The Town currently plans on removing the remaining load through the advanced onsite program.

Implementation Goals

The goal of Brewster's advanced onsite treatment program is to upgrade enough onsite systems within the watershed to remove the remaining nitrogen needed to meet Brewster's TMDL requirement for Pleasant Bay. Approximately 980 kilograms of nitrogen need to be removed through the onsite program under current conditions. Additional nitrogen removal may be needed to accommodate future development within the watershed.

The planning for a successful advanced onsite system program requires consideration of several issues to ensure it is successful and will be in compliance with the TMDL and the watershed permit. They include:

- Development of a regulatory program to implement the advanced onsite system program;
- Selection of the appropriate nitrogen removal requirements for the proposed onsite systems to ensure the TMDL goal is met;
- Selection of the appropriate advanced onsite systems to incorporate in the program, or the selection of performance standards for the systems to be used, to allow for the inclusion of new technologies over time;
- Determining the number and location of properties where the use of an advanced system will be required;
- Development of an operation and maintenance program with clear oversight by the Town to ensure the systems that are installed and operated properly to meet their nitrogen reduction requirements; and
- Development of monitoring programs under the Town's supervision to confirm that the advanced systems are in compliance with the state's septic system regulations (Title 5, 310 CMR 15.00) and DEP's monitoring requirements to confirm TMDL compliance.

HW has conducted an initial analysis of these issues as discussed below and in the two attachments to this memo. An outline of the implementation plan also accompanies this memorandum.

Regulatory Approach

A regulation requiring the use of advanced onsite systems in the Pleasant Bay watershed will be needed to implement the program. There are two regulatory mechanisms that could be used; the adoption of a general bylaw or the adoption of a Board of Health regulation. HW recommends a combination of both. A general bylaw will require the use of the advanced onsite systems in the watershed with the appropriate number and treatment capability to meet Brewster's portion of the TMDL. The general bylaw will also mandate that the Board of Health develop regulations that provide the details of how the program will be implemented and administered over time with authority for enforcement with the Board of Health.

A general bylaw must be adopted by a simple majority at Town Meeting. Using this approach, the Town is given the opportunity to review and approve the proposed program and make an affirmative vote to adopt it. Board of Health regulations are adopted by a simple majority of the Board. This process doesn't provide for the same level of involvement for Town residents. However, having the Board adopt the implementation regulations allows opportunities to change or update the requirements over time, without the need to return for a Town Meeting vote. This will be helpful if new technologies are identified, or if there are other changes that warrant updates to the regulations.

This hybrid approach provides the benefits of both approaches; input from all Town residents in the approval of the bylaw, and flexibility to implement the program and adapt to changing circumstances through the proposed Board of Health regulations. The general bylaw could incorporate provisions for how the program will be financed, if the Town agrees to fund a portion of the costs (see the Financing section below).

A draft General Bylaw is attached to this memo in preliminary form. Additional detail will need to be added as the decisions on how the program will be implemented are made.

Advanced System Selection and Treatment Requirements

Information on the advanced systems that Brewster might consider for use is currently being developed by the Pleasant Bay Alliance through the Southeast New England Program (SNEP) grant it received to help implement the Pleasant Bay watershed permit. This analysis will review the available technologies to rank them based on performance, reliability, and cost for installation and annual operation and maintenance.

There are two approaches for selecting which systems should be used in Brewster. Specific technologies could be approved for use, or a specific nitrogen removal concentration could be established and systems that are proven to meet this requirement could be chosen by the property owner with approval by the Board of Health.

The factors that need to be considered in selecting an approach include:

- The nitrogen removal capability of the systems selected for use in the program. The nitrogen reduction provided by an advanced system directly impacts how many systems must be upgraded. Fewer systems must be upgraded to meet the TMDL if the systems provide a higher level of nitrogen treatment. Further discussion on the number of systems requiring treatment is provided in the next section.
- The reliability of the chosen systems over the long term. The Town is responsible for ensuring that the TMDL nitrogen reduction goals are met and will need to have oversight of system performance. If the Town chooses to only allow the use of one or more systems, there may be issues if the systems do not provide the expected level of nitrogen treatment. If systems are operated and maintained properly, then the owners of the systems would likely not be liable for not meeting a nitrogen compliance goal as they installed the system the Town required them to install. One way to manage this concern might be to obtain a performance guarantee from the system manufacturer that states they will guarantee compliance with the nitrogen reduction levels set by the Town. In

addition, if the Town decides to select specific systems for use, there will likely need to be a proposal process to properly establish which systems will be used and what price will be provided.

- The cost for system installation, operation and maintenance. The cost for a system that provides a higher level of treatment may be more, and this could play into how many properties will be required to upgrade their system. There will be tradeoffs between cost and performance that the Town will need to consider as the program moves forward.
- The market for nitrogen reducing septic technologies is advancing and there will be changes over time. Therefore, selecting specific technologies may limit the Town from utilizing new technologies that may perform better or offer a cheaper alternative in the future. Establishing a set nitrogen reduction limit would avoid these types of complications.

Number of Properties Requiring and Advanced Onsite System

The level of nitrogen treatment provided by an advanced onsite system and the location of a property in the watershed both factor into how many systems must participate in the program. Some properties are in areas where there is significant attenuation of nitrogen before it reaches Pleasant Bay via groundwater. This occurs in areas where nitrogen in groundwater flows to a pond and then back into groundwater before it discharges to the Bay. This process removes approximately 50% of the nitrogen contained in the groundwater that enters a pond. In some areas in Brewster groundwater flows through multiple ponds before entering the Bay. It may not be worthwhile to install nitrogen treatment systems in areas where this attenuation is taking place.

HW has analyzed how many properties may need to participate in the program based on the level of nitrogen reduction that is needed. This is summarized in the attached memo which shows that most of the homes in the subwatersheds where there is no attenuation will need to be upgraded to meet the TMDL goals. This analysis will be refined over time as additional information becomes available.

Operation and Maintenance (O&M)

The performance of the advanced onsite systems is directly tied to the way they are operated and maintained. Based on conversations with MassDEP, the Town must have oversight of the O&M program to ensure systems are working sufficiently to meet the nitrogen reduction goals of the TMDL. These requirements should be incorporated into the General Bylaw and the Board of Health regulation. The details on the required O&M practices will depend on the systems selected for use. The Town could:

- Hire a certified wastewater operator that works for the Town and is responsible for operating all systems upgraded under this program. The value of this option may depend on how many properties are included in the program and whether there are too many or too few systems for a Town staff person to manage. The financing for this approach could be provided by property owners who pay the town for the O&M of their system.

- Establish a program to review and approve certified operators that contract with property owners to operate and maintain their systems. Under this approach, the Town would need a program to review the O&M work conducted by the approved operators and likely conduct some spot checks to verify systems are operating properly.
- Work with other communities and possibly Barnstable County to establish a regional approach to O&M management. It might be possible to have the County establish a certified operator program that works on behalf of the Town, and other communities on Cape Cod to provide O&M for advanced onsite systems.

Further discussions in Brewster, with Barnstable County and with neighboring Towns are needed to develop and adopt an appropriate O&M process that provides the proper oversight and control by the Town. However, the process is conducted, the Town will require access to each property to inspect and possibly manage the O&M of the systems. The draft General Bylaw incorporates language to address this issue.

Monitoring

Monitoring of all systems that are upgrades will be needed to confirm compliance with the nitrogen reduction goals in the TMDL. HW has discussed the monitoring requirements under the TMDL with MassDEP. At a minimum each system will need to be tested annually with effluent samples analyzed for total nitrogen concentrations. Mass DEP recommends that 1/12th of the systems installed in the watershed be tested each month. In the first month a random selection of system representing 1/12th of the total would be tested. In month two a second round of systems would be tested. Over a year all the systems would be tested in this fashion. The nitrogen reduction documented in the monitoring plan will be compared to the TMDL goal to confirm the program is working. It is anticipated there will be some variability in the performance of the systems and it is anticipated that an average nitrogen reduction across all the systems will be used to compare to the TMDL goal. However, data showing a system isn't meeting its performance goal should also be flagged so an operator can inspect the system and bring it into compliance.

In addition, many systems will require additional testing based on the innovative and alternative system regulations in Title 5 (310 CMR 280). New technologies must be approved following these regulations and there are monitoring requirements established by MassDEP for these systems. Depending on the systems used in Brewster there will be a need to evaluate how to incorporate this testing into the TMDL monitoring discussed above.

The Town will be responsible for overseeing the monitoring of the advanced systems to ensure compliance with the TMDL and a program to oversee this work will need to be established. There may be opportunities for collaboration with the Barnstable County Department of Health and Environment in the collection, recording and evaluation of this data, options the Town should explore.

Annual Watershed Permit Reporting

The implementation of the program will need to be documented in the annual reports that are required under the Pleasant Bay watershed permit. A framework for the annual report should be developed that includes:

- Updates on the adoption of, and any changes to, the regulatory program;
- Reporting on the number of systems installed and their locations in the watershed;
- A summary of the O&M activities during the reporting period; and
- A summary of the monitoring conducted, including calculations of the amount of nitrogen removed relative to the TMDL nitrogen reduction goal.

Financing

As this program is developed there will also need to be discussions within Brewster on how it will be financed. HW described options for Town and individual property owner financing in a memo dated June 29, 2017 that provided a range of ways to pay for the program. Town involvement in the financing will allow access to State Revolving Fund loans available through the Pleasant Bay permit, as well as other locally generated funds. Town involvement also recognizes that residents beyond those property owners in the watershed benefit from the restoration of Pleasant Bay. An in-depth discussion of an equitable financing program should take place at the same time the implementation plan is developed and should involve extensive input from Town Boards and residents.

Next Steps

The implementation plan will evolve as more information on potential advanced systems is available and as the Town Boards and residents get involved in the discussion. The following next steps are recommended based on the information gathered to date:

- Work with the Pleasant Bay Alliance to identify and evaluate advanced nitrogen reducing septic systems, focusing on their performance, reliability, and cost. The majority of this information will be developed by the Massachusetts Septic System Test Center for the Alliance through the SNEP grant mentioned above.
- Select an approach for choosing which systems will be used in Brewster. The Town could decide to require new systems to meet a specific performance standard or could select a suite of systems allowed for use under the program based on their performance and reliability.
- Determine an effective approach to oversee the operation and maintenance program for the selected systems to insure they are functioning properly. The Town could run this program themselves, contract out for the services needed or set specific requirements in the approval of each system. However it is done, the Town must have oversight of how the systems are maintained to insure they meet their performance goals.
- Finalize the monitoring program based on the specific requirements for the technologies chosen for use in the program.

- Incorporate a strong public participation program in the implementation planning. Regular meetings with the Select Board and Board of Health will be important as well as other outreach activities including public meetings and meetings focused on the property owners affected by the program.
- Continue discussions on how best to finance this program, evaluating public and private funding approaches. This evaluation should be concurrent with the rest of the implementation planning, especially as decisions on the technologies chosen and on the oversight of operation and maintenance will affect the overall project cost.

Pilot Program

The Town should plan for a pilot program that starts during the implementation planning process to test out the options considered for the selection of systems, and the ongoing operation, maintenance and monitoring practices. Five to ten sites should be chosen for the installation of pilot systems, with the systems chosen based on the information provided through the Pleasant Bay Alliance SNEP grant analysis. The Town should solicit volunteers to allow the installation on their property. This will give valuable information on installation costs. It will also provide worthwhile experiences with operation and maintenance to guide how this process can best work moving forward. It will also be useful in evaluating the mechanisms for ongoing monitoring of the systems. The Town could begin with an installation at a Town property such as with an upgrade of the septic system at the Captains Golf Course.

References

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