

Regional Watershed Permit Implementation Project for Pleasant Bay

Fact Sheet: Municipal De-nitrifying Septic System Program

Introduction/Project Objective

As part of the Southeast New England Program grant issued to the Pleasant Bay Alliance, the Town of Brewster evaluated the potential for using advanced septic systems (also called Innovative/Alternative or I/A systems) to reduce the nitrogen discharged into its portion of the Pleasant Bay watershed. The objectives were to evaluate the level of nitrogen reduction needed, understand the state's monitoring and oversight requirements, identify technologies that could provide the necessary reduction, assess program costs and recommend a regulatory structure that could be used to implement the program. Horsley Witten Group was lead technical consultant with contributions from the Barnstable County Health and Environment Department (I/A technology assessment) and Wright Pierce (cost model).

Assessment of Technologies able to meet required Nitrogen Reductions

The Massachusetts Estuaries Program model used for the Pleasant Bay watershed estimates the nitrogen load from a traditional septic system using 90% of water consumption and a nitrogen concentration of 26.25 milligrams per liter (mg/L) for effluent discharged from traditional onsite septic systems. This concentration is lower than the typical nitrogen concentration for septic tank effluent entering a leaching facility as it takes into account nitrogen removed in the leaching facility as well as in the underlying soil. Using this estimated concentration, it was determined that each septic system in the unattenuated watersheds in Brewster would have to use an advanced nitrogen removal system to meet Brewster's nitrogen reduction goals.

Furthermore, these systems would have to meet a treatment level of 12 mg/L to be able to fully meet Brewster's remaining portion of the Total Maximum Daily Load (TMDL) for nitrogen for Pleasant Bay. Currently there are no systems with "General Use" approval from the Massachusetts Department of Environmental Protection (DEP) that can provide this level of treatment. There are two technologies with pilot or provisional approval that might be able to meet a 12 mg/L threshold.

Cost Model

The cost for installing, operating and monitoring an advanced onsite system will depend on the technology that is selected and the level of oversight. The project estimated a capital cost for each system of approximately \$33,900 and an annual operation and maintenance and monitoring cost of about \$2,360. These costs are based on available information for the two systems identified as potentially capable of meeting the 12 mg/L nitrogen effluent standard, as well as information from DEP on monitoring and oversight requirements. Monitoring costs are higher for these systems because they are not yet approved for General Use.



Brewster has 341 homes in the watershed that could be included in a municipal I/A system program.

This project is supported by the Southeast New England Program (SNEP) Watershed Grants. SNEP Watershed Grants are funded by the U.S. Environmental Protection Agency through a collaboration with Restore America's Estuaries. For more on SNEP Watershed Grants, see www.snepgrants.org

Management Structure for a Municipal I/A Program

A management structure was proposed to establish the municipal I/A program and address ongoing operation, maintenance and monitoring requirements.

Program Adoption: Two regulatory mechanisms are proposed to establish the program: (1) a general bylaw adopted by Town Meeting vote to establish the program and (2) implementing regulations adopted by vote of the Board of Health to administer the program. The general bylaw would (a) 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 and (b) mandate that the Board of Health develop implementing regulations that provide the details of the design, maintenance and monitoring requirements for systems as they were installed. This approach provides a Town Meeting authorization to establish the program, and also allows flexibility for the Board of Health to update implementing regulations over time without the need for a Town Meeting vote.

Operations and Monitoring: The performance of the advanced onsite systems is directly tied to the way they are operated and maintained. Based on MassDEP policy, 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.

DEP will also require regular monitoring for all advanced systems including quarterly sampling for the first year, and annual sampling thereafter. Systems that do not have General Use approval from DEP will have to be sampled quarterly for up to three years. Also, each system will need to be inspected monthly to ensure it is operating as intended.

Lessons Learned

- The use of Innovative/Alternative (I/A) systems as part of a comprehensive nitrogen management plan requires municipal oversight. Operation and management decisions cannot be left to the individual homeowner. Communities will need to maintain a management program staffed by appropriately certified wastewater treatment plant operators. Communities have the option of using municipal staff or contracting operators overseen by the municipal government.
- Program costs are driven by the availability of technologies capable of meeting the required level of nitrogen reduction and by the need for a robust system of inspection and testing. In Brewster's case, the two technologies with potential to meet the require 12 mg/l are not approved for General Use, and this results in higher costs of monitoring and inspection.
- SRF funds may be available to cover costs in a municipal I/A program. Federal regulations governing the State Revolving Fund (SRF) program allow for loans to privately or publicly owned facilities, and Massachusetts dedicates \$5 million a year for septic repair and replacement projects through the State Revolving Fund (SRF). MassDEP is in the process of providing guidance on how to access these loans as part of an overall implementation strategy under a Comprehensive Water Resources Management Plan or Targeted Watershed Management Plan to install nitrogen reducing septic systems. Currently, the SRF program does fund a Community Betterment Septic Program that provides low interest loans to homeowners to upgrade or replace failed septic systems.

This information was summarized from the following reports:

Pleasant Bay Alliance Task 1A: On-Site Denitrification Systems Summary Report, July 2020, Horsley Witten Group

Implementation of an Onsite Septic System Treatment Program for the Pleasant Bay Watershed, December 2018, Horsley Witten Group