



COALITION Quarterly

FINALLY



5 Days, \$22K



AFFORDABLE WASTEWATER TREATMENT

BCleanWater.org

A Note from The Helm

Mike Egan is the President of BCWC, our chief supporter, cheerleader, and my good friend. Five years ago, he tasked me with the effort to figure out how to “clean up” the waters of Cape Cod where he has been a passionate angler for decades. More than once, Mike has said “Let me know when we take the first kilogram of nitrogen out of our water.” Mike, I can finally report that we have started!

The cover photograph shows one of the 8 NitROE systems we have installed in the Sand Shores neighborhood abutting Shubael Pond in Marstons Mills. This site was chosen by the U.S. Environmental Protection Agency (EPA) and the U.S. Geological Survey (USGS) because it represents the best location to study how changing a cluster of homes from cesspools and old Title 5 systems to new advanced septic systems will improve our waters.

On Cape Cod, groundwater moves one to four feet a day. This neighborhood is next to one of the Cape’s iconic “kettle hole” ponds. Created by glacial activity millennia ago, this pond offers a window into our aquifer. Sadly, the pond has been closed to swimming for three years due to harmful algal blooms (HABs) caused, at least in part, from untreated septic wastewater loaded with nitrogen.

The EPA has drilled and installed over 35 groundwater monitoring wells in a small portion of this neighborhood. These wells will give us over 70 water sampling sites where we can study changes in groundwater. We have already identified the nitrogen plumes from the septic systems, which contain between 5mgs to over 20mgs of nitrogen. We can also track the water coming from the pond and will examine over 200 constituents in the groundwater.

This comprehensive study is the first of its kind in the United States. We will monitor household water use with special water meters, wastewater influent and effluent, and in some cases, wastewater flowing out of the leach field. Unique nitrogen sensors are being deployed at each site to verify and calibrate what we see from our monthly monitoring.

Although BCWC is interested in other new advanced septic systems, the NitROE has many characteristics we consider critical: best in class wastewater treatment, modular installation, simplicity of operation with only one working element (an air pump), gravity operation in the absence of power, real time monitoring and low-cost maintenance.



The Cape Cod Commission and others have estimated that only 30,000 to 40,000 of the Cape’s 165,000 plus parcels will ever get municipal treatment. Best case scenario is that it will occur over 30 years with costs that will run into the billions of dollars. We agree that municipal expansion is important, but it is taking too long, and the funding is uncertain. Moreover, the expansion is targeting estuary protection, while our freshwater ponds, lakes and aquifer are crying out for help!

With the new NitROE systems at Shubael Pond, and others we are working on, we hope to reach the 50-system threshold that is required by the Massachusetts Department of Environmental Protection to apply for a fully permitted new septic technology. Rigorous testing has been done and will continue. More systems need to be installed throughout the region and if you or someone you know needs to upgrade or install a new septic system, please contact us!

The newly installed advanced system shown on the cover was finished in five days. The cost? About \$22,000! Sewer expansion: \$100-200,000 per parcel.

We Went Where the Data Told Us to Go: Shubael Pond

Jennifer Loughran, BCWC Project Manager - Innovative Solutions, met with Laura Erban, a Groundwater Hydrologist from US EPA, to discuss the process used to select the location for our innovative and alternative (I/A) septic system project.

JL: Over the past year, we have had many opportunities to tell the story about the Shubael Pond I/A Septic System Project to various constituents. Many people asked, “Why was the Shubael Pond area chosen?” “And why were certain homes selected to be a part of the project to have the NitROE systems installed?” Can you tell me about the selection process?

LE: We started by screening the entire Three Bays watershed in Barnstable for candidate neighborhoods. Throughout the watershed, we looked for a neighborhood with high housing density and where there would be a lot of wastewater going into the ground. We also looked for an area with short travel times for groundwater flow to a surface water body, like a pond or saltwater embayment.

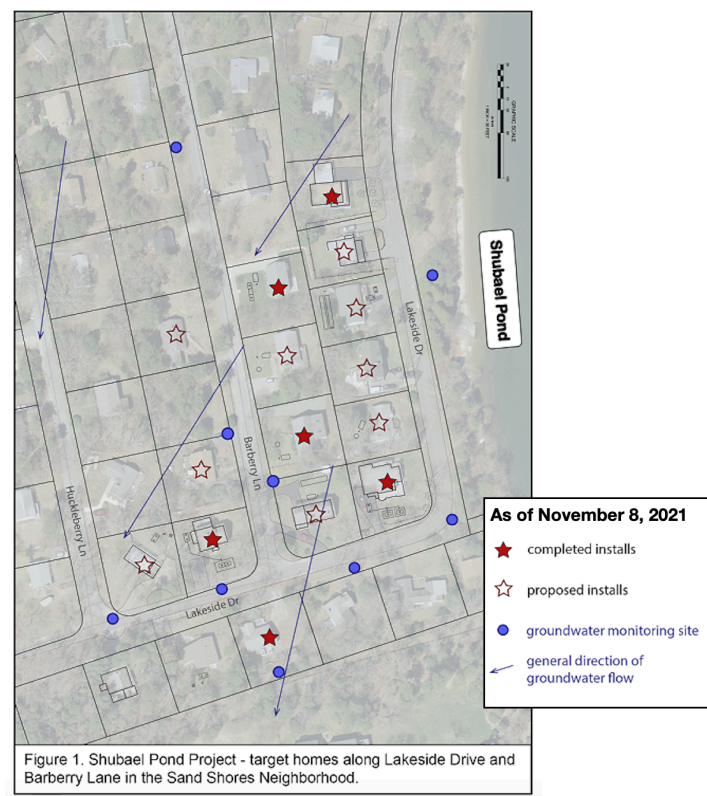
JL: This criteria makes a lot of sense. What led you to Shubael Pond and the Sand Shores Association neighborhood, which is on the southwest side of the pond?

LE: Working with the USGS, we spent a good amount of time understanding subsurface conditions, including nitrogen concentrations in groundwater in different parts of the watershed. We had drilled wells in four locations — one in Osterville and three in Marstons Mills. We looked at data from this hydrogeologic characterization, but also took into consideration the social aspect. The Sand Shores neighborhood met the criteria, but the community interest and BCWC’s engagement with the Association’s leadership helped inform the decision and create a partnership that made sense. This community outreach component was critical. The EPA and USGS can do the groundwater monitoring, but BCWC’s involvement in achieving neighborhood acceptance was very important in committing to a location.

JL: You have water monitoring and sampling wells in various locations, and you have been very strategic on where the wells have been placed. At this point, you have more than 30 wells in this area— why so many?

LE: It’s one thing to understand the general direction of groundwater flow in a region and then another thing to understand specifically at a household scale. The actual direction of the water flow can change a lot across those different levels, which we saw earlier in our groundwater flow analysis. We ended up putting in a lot more wells to map flow directions better, which helped us target the cluster of homes located on Lakeside Drive and Barberry Lane in the neighborhood (Figure 1). We later installed monitoring wells at multiple depths in this area to better understand the impact of the I/A septic upgrades on groundwater quality.

For more information about the selection process used by Laura and her partners at the USGS, check out BCWC’s Spring 2020 newsletter.



Groundbreaking News: Shubael Pond Innovative and Alternative Septic System Project

We are excited to report that the installation of KleanTu NitROE Wastewater Treatment Systems (NitROE) began in August with the first installation on Lakeside Drive in Marstons Mills. During the month of October, five more NitROE systems were installed and completed at properties located on Lakeside Drive and Barberry Lane.

The Shubael Pond properties in the Sand Shores neighborhood are less than a quarter of an acre. Working with small lots offered us opportunities to creatively design the placement of the NitROE tanks in between Title 5 septic tanks and leach fields. Mission accomplished!

BCWC's goal is to have a total of 10 NitROE systems installed by the end of 2021, and another five installations completed by spring 2022.

Pictured on this page

Over the course of five days, a NitROE tank was installed, and landscaping was completed at one property.

E. Stevens Construction is responsible for the installation and excavation for the project.



“There’s no time to wait for the town’s comprehensive wastewater management plan. Everyone’s aware that there’s this 30-year plan, but I think something’s got to be done before then.”

– Sand Shores Homeowner, who has lived on the Cape for 50 years and has seen the population triple.



NitROE tank fully installed with cover and sampling ports. One less cesspool in Barnstable!



Note the chambers with woodchips and limestones, the main components that aid in reducing nitrogen from wastewater flowing through the NitROE tank to the leach field.



EPA Science in ACTION – Shubael Pond HABs Research

Over the past six months, the US EPA worked with the town of Barnstable and its Coastal Health Resource experts to conduct further research in Shubael Pond, specifically to understand the harmful algal blooms (HABs). Multiple levels of research were conducted. The first was anchoring one buoy (approximately two feet in diameter) in the pond with sensors. The sensors were used to measure chlorophyll, phycocyanin (a pigment indicative of cyanobacteria) and nitrate – which are all components of cyanobacteria algal blooms. In addition, twice a month sampling across the pond was conducted to make several other measurements in the lab.

Preliminary results from the summer of 2021 indicated some cyanobacteria activity with overall chlorophyll and phycocyanin higher in the spring with a slight uptick later in the season. The chlorophyll and phycocyanin levels at

the buoy location remained relatively low for most of the season. The data collected this year is the first collected as part of a multi-year study; therefore, no conclusions can be drawn yet. EPA researchers hope to expand on these efforts with the addition of more dense sampling at multiple locations throughout the pond.

To learn more about the research conducted this summer and fall, please read the August 2021 EPA Science in ACTION news bulletin by scanning this QR code.



Pictured are the two EPA sensor buoys being used to collect data on HABs. One buoy was placed in Shubael Pond and the other in Hamblin Pond.

Spreading The Word: Shubael Pond Project Installation Tours

CAPE COD TIMES



Zenas Crocker left, executive director of Barnstable Clean Water Coalition, gives a tour of the newly installed NitROE wastewater treatment septic systems in a Shubael Pond neighborhood in Marston's Mills to Mark Forest, Barnstable County commissioner and Yarmouth selectman. The technology is part of a two-year wastewater pilot project. Ron Schloerb/Cape Cod Times



Scan the QR code to read the full Cape Cod Times article on BCWC.

In October and November, six tours to observe the NitROE installations and understand the Shubael Pond Project were conducted. State Senator Julian Cyr, State Representative Kip Diggs, Barnstable County Commissioner Mark Forest, Town Council President Matt Levesque, as well as representatives from Barnstable's Department of Public Works, the Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency viewed the installation sites. Water quality advocacy group reps from Bourne, Brewster, Dennis, Mashpee, and Yarmouth also attended the tours. To date, more than 50 people have visited the neighborhood to learn about this groundbreaking project.

Poor water quality is not just a Barnstable problem, it is a Cape-wide problem. We need all towns working together to improve the health of our waters.

To schedule a tour or presentation for your community or group, or to learn more about installing a NitROE system at your home, please contact Jennifer Loughran at jloughran@bcleanwater.org.

Zee Crocker speaks with State Representative Kip Diggs, State Senator Julian Cyr, Barnstable Town Council President Matt Levesque and EPA Research Biologist Tim Gleason.





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*Barnstable Clean
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works to restore and
preserve clean water
in Barnstable. BCWC
utilizes science as its
foundation to educate,
monitor, mitigate and
advocate for clean water.*

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**In this video, Zee Crocker explains
the importance of the Shubael Pond
Innovative/Alternative Septic System
project and the use of NitROE
systems to improve water quality.**



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