GAZETTE



COALITION Quarterly DOUBLE ISSUE

Rules, Regulations, and Resources

VINEYARD

The Enterprise

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Health Board Passes New Septic Regulations

New Wastewater Rules Arrive in Tisbury



BCleanWater.org

A Note From The Helm

Regulations, Resources, and Results

When it comes to new Innovative/Alternative (I/A) septic systems (individual wastewater treatment systems), we have currently assessed that the KleanTu NitROE I/A stands out as best in class. We believe that meaningful performance equates to removing 90% or more of the nitrogen in wastewater. Less than that is simply not good enough to protect our precious waters including groundwater, surface water, lakes, ponds, estuaries, and coastal waters.

To that end, we acknowledge that an individual system alone doesn't tell the whole story. Like any large municipal system, individual systems must reliably work together to achieve certifiable performance.

Regulators will look to an organization they refer to as a Responsible Management Entity (RME) to guarantee such performance. An RME will manage testing, performance certification, tracking, compliance, maintenance and more. Simply put, who will support and fix I/A systems? Who will ensure the septic tank is pumped on time (not optional)? That the required power is on? And so forth. One or more businesses may be involved in this project.

The local municipality, the Massachusetts Department of Environmental Protection (MassDEP), and the local Boards of Health all have "skin in the game". Everyone needs to be confident regarding a system's performance and what that means for regulations of our waters.

Who pays? For municipal sewer expansion, there are various potential funding sources. The same should be true for individual systems that fall under similar regulations, jurisdictions, and standards. This may include federal funds via state revolving funds (SRF) loan program, tax credits at the state and local level, grants, private and public loans, individual homeowner payments (for services provided) and more. Some of these payments may be wrapped into the RME structure and required; others may be up to individual selection.

When it comes to finding contractors in the town of Barnstable, you can choose the company who will connect your home to the sewer. Likewise, you should be able to select a contractor for your I/A installation, as well as for service elements such as who pumps your septic tank.



There is much to be determined regarding the adoption of I/A systems, with the critical element of "performance" coming into the "feedback loop". Regulators (both state and local) must be confident that performance standards are being met. For many watersheds falling under the new Nitrogen Sensitive Area (NSA) regulations on Cape Cod, performance is the lynchpin. Sewer expansion may guarantee 100% nitrogen removal in one sub-watershed, but this is not a "zero-sum" game and money matters. Thus, if an I/A system delivers 90 or 95% removal for some fractional cost, is that good enough?

As a community how do we weigh the value of 95% nitrogen removal within 5 years of a system's installation, versus 100% in 20 or 30 years?

In this newsletter, we aim to provide answers, or at least a roadmap, to answer some of these questions. We don't have all the answers, but we can help.

We are also providing an update on the "best in class" I/A technology we have been testing as part of our Shubael Pond project. Recall that this is the only I/A project testing I/A's in "real world" conditions. The results look great!

Consistent and Impressive

The Shubael Pond Project began in 2021 and now has 13 homes participating. BCWC financed and managed the installation of KleanTu NitROE innovative/alternative (I/A) septic systems at each home with the latest installation completed in September 2023. The goal of this project is to test these systems in a neighborhood with real world conditions and prove that these systems can achieve nitrogen reduction equal to or better than a municipal treatment plant.

As the chart below shows, these systems are proving they can reduce nitrogen by more than 95%.



Influent is how much nitrogen is flowing into the septic tank.

Effluent is how much nitrogen is coming out of the NitROE system.

Municipal treatment plants target 3 mg/L

Total Nitrogen (mg/L) from 12 of the NitROE systems as of September 2023 as reported by the Massachusetts Alternative Septic System Test Center (MASSTC) and the U.S. Environmental Protection Agency (US EPA).

BCWC worked closely with our partners at the US EPA, USGS, The Nature Conservancy, and the Town of Barnstable to implement this groundbreaking research pilot.

"Performance is really impressive. We are consistently seeing lower than 10 mg/L in the effluent, frequently it is lower than that" says Dr. Sara Wigginton from MASSTC, who leads the monthly

sampling of the Shubael NitROE systems. Dr. Wigginton further states that "the NitROE system is a strong candidate for the enhanced, innovative and alternative system that Cape Cod towns will be using to meet the new MassDEP regulations."

RIGHT: Dr. Wigginton with her colleagues collecting samples from the Shubael Pond Project NitROE systems.



I Need a New Septic System, What Do I Do?

More than 95% of Cape Cod homes have a cesspool or traditional septic system, commonly called a "Title 5 system" in Massachusetts. These systems do their job of removing wastewater from our homes and treating pathogens. However, they were never designed to remove nitrogen from our urine, which seeps into our groundwater, and eventually into our ponds, rivers, bays, and coastal waters.

If you are a homeowner with a Title 5 system that has failed or needs to be upgraded, it can be very confusing on what you need to do. The recent Title 5 state regulation changes (see page 6) make it even more daunting. And what if your town has a multi-decade sewer plan, like Barnstable's 30-year Comprehensive Wastewater Management Plan that just started a few years ago?



Mini Wastewater Treatment System in Your Yard

Nitrogen reducing septic systems, commonly referred to as I/A systems, are an essential tool in the toolbox. Many I/A systems can be a simple retrofit to your existing Title 5 system or designed into a replacement of your overall system.

I/A systems typically have two functioning areas to aid in the nitrification and denitrification processes. In the first chamber, a calcareous material like limestone is used to balance the pH along with circulating air to convert the ammonia found in our liquid waste to nitrate. Once this happens, the liquid flows into a second chamber that typically has a carbon source like woodchips. Here it will create denitrifying bacteria that in the absence of oxygen, the nitrate will convert to a harmless nitrogen gas. I/A systems that can reduce nitrogen by at least 90% are considered by MassDEP as "Best Available Control Technology" (BACT) and what homeowners should consider when selecting a system.



Step-by-Step Instructions for Installing An I/A System

- 1. Find out if you live in a Nitrogen Sensitive Area (NSA) and if your town is applying for a Watershed Permit (WP). Please refer to the NSA map on this issue's cover page.
 - If you live in an NSA and your town is not applying for a WP, you will most likely need to install an I/A system.
 - If you live in an NSA and your town is applying for a WP, you should discuss with your town's Board of Health if you should install an I/A system.
 - If you live in Barnstable, visit the town's website (Administrative Dept>Assessing Division>Property Look Up) to determine if your property is scheduled to be connected to the town's sewer system.
- 2. Explore your financing options. The state, Barnstable County and a few Cape Cod towns have several options to help you. See page 6 for specific programs.

- **3. Select a local engineer.** Choose a firm that specializes in civil engineering, land surveying, environmental permitting and understands the soil conditions of Cape Cod. They will design a system plan specific to your site and will secure approvals and construction permits with your local Board of Health and Conservation Commission (if you live near wetlands).
- **4.** Working with your engineering firm, **select an I/A system manufacturer and installer** that offers an I/A system technology (BACT) that meets your goals and budget.
- 5. Once permits have been secured by your engineer, hire an excavator that will install your system and notify your town of the installation. It is important that the excavator is trained to install the I/A system you have selected.
- 6. Set up a system maintenance contract with a service provider.
- 7. Follow the US EPA's Septic Smart tips to ensure the proper function and longevity of your septic system.

Check out the Resources page on the BCWC website for more information.





Changes to Title 5 Regulations: What You Need to Know

On July 7, 2023, MassDEP took significant strides toward protecting Cape Cod's waterbodies by amending the state environmental code (310 CMR 15.000) that regulates septic systems. Designating new Natural Resource Area NSAs impels municipalities to address wastewater pollution. These regulation changes are critical to preserving our waters.

Municipalities now have two choices for managing their share of nitrogen pollution:

Apply for a Watershed Permit. These permits are issued by MassDEP for 20-year watershed management plans allowing towns to use a range of nitrogen-reduction solutions like sewer connections, I/A systems, cranberry bog restoration, fertigation wells, and oyster aquaculture to name a few. This allows for the most flexibility in abating pollution.

Mandatory I/A septic systems in NSAs. If a town opts not to apply for a Watershed Permit, mandatory I/A installations (referred to as BACTs) are required for existing homes and new construction.

On Cape Cod, there are 12 towns and 31 watersheds that are in an NSA. Chatham and Orleans already have Watershed Permits and the other towns have decided to file a Notice of Intent with MassDEP or have already filed one. The Resources page on our website has a chart listing the actions being taken by each town and watershed.

FUNDING SOURCES FOR SEPTIC SYSTEM INSTALLATIONS

Since every home is different, costs will vary. For example, a three-bedroom home on a one-acre lot requiring just an I/A system retrofit will have significantly different costs than a five-bedroom home within 400 feet of the ocean that needs to replace its entire septic system. An engineer that has experience with I/A system installations will be able to give you an estimate of your costs before you proceed.

The following are state, county and business programs available to finance septic system installations.

- Title 5 Septic Tax Credit as part of the Healey and Driscoll Administration's FY2025 Budget, a dramatic increase in the tax credit for owners of a primary residential property in Massachusetts is available for replacing or repairing septic systems. The tax credit has been increased from \$6,000 to \$18,000.
- MassHousing Septic Repair Loan Program this quasi-public agency provides low- or no-interest financing to help Massachusetts homeowners address failing or non-compliant septic systems.

- Cape Cod AquiFund Program managed by Barnstable County, this program provides financial assistance to Cape Cod homeowners in the form of low-interest loans for septic system replacement, installation of I/A systems and sewer connections.
- Loans and Grants from USDA's Rural Development Program - options for low-income homeowners include Section 504 Home Repair and Section 502 Direct Loan Programs.
- Cape Cod 5 Loan Program this community bank offers loans to homeowners for sewer or water main construction, septic tank removal and plumbing.
- Some Cape Cod municipalities offer loans or subsidies to homeowners upgrading, repairing, installing I/A systems and/or connecting to a sewer. Contact your local Board of Health for more information.



COALITION Quarterly

CAPE COD TIMES **'IT'S A WIN-WIN'**

Wetlands are natural sewage cleanser in Barnstable cranberry bog plan



BCleanWater.org

A Note From The Helm

State of the Bogs

This past summer, BCWC was fortunate enough to receive a grant of nearly \$1.3 million, allowing us to purchase approximately 64 acres of cranberry bogs. This grant, from the Massachusetts Executive Office of Energy & Environmental Affairs, is a game changer for our Marstons Mills Cranberry Bog Restoration Project.

We have already received support from the US EPA's Southeast New England Program (SNEP) to conduct prerestoration work: sampling, monitoring, studying, designing, and planning. The primary goal of this project is to significantly reduce the nutrient load using a nature-based approach.

The target area is the contaminated, groundwater-fed surface waters of the Marstons Mills River that flows through our bogs. The river transports millions of gallons of nitrogen-loaded water into the Three Bays estuary every day. Our scientific studies, conducted with the help of the late Dr. Brian Howes and the University of Massachusetts School for Marine Science and Technology program, proved that onethird of the excess nitrogen in the estuary transits this river.

The Three Bays estuary is the third most polluted estuary on Cape Cod as measured by nitrogen overload. All the worst estuaries here are fed by nutrient-loaded river systems. Our work on the bogs located at the headwaters of the Marstons Mills River is critical to understanding how restored wetlands can improve the waters of Cape Cod and southeastern Massachusetts.

Both climate change impacts and farmers declining ability to compete with more productive cranberry farming outside the region are anticipated to open 14,000 acres of bogs to restoration in Massachusetts. Prior to cranberry farming, these bogs were all natural wetlands

Restoring wetlands is not a new concept. Work to restore the Everglades in southern Florida has been ongoing for decades. In Massachusetts, the first cranberry bog restorations began about a decade ago. However, our efforts in Marstons Mills, along with the Cold Brook restoration in Harwich, are the first to specifically target nitrogen reduction.

The urgency of this work can't be ignored. Already, we have seen eelgrass beds die off in our estuaries and just offshore. Harmful algal blooms are a regular occurrence, threatening our shellfish and recreational industries.



Between sharks and dirty water who will want to visit Cape Cod?

For the Three Bays estuary, this effort really is the "cavalry coming over the hill". Our restoration is the ONLY project that can meaningfully improve water quality in our lifetime. You may ask, "How can that be so?"

Surely other projects, like the town of Barnstable's sewer expansion plans and our own efforts to spur the use of I/As will make a difference? They will, but not fast enough. Groundwater on the Cape moves between 1 and 4 feet a day, and our polluted groundwater will be with us for a generation even once the sewer plan is expanded and I/As are installed. Source reduction takes time to work. Just look at Boston Harbor!

Our project can pay "clean water dividends" quickly. The polluted river transits the bogs and reaches the estuary in just about six hours. Once restored, we may be looking at hours, not decades to start the move towards CLEAN WATER.

The next steps will be the hardest and we are reliant on your support to raise the millions of dollars we need to complete this restoration. Your assistance is crucial to our efforts and success. Please contribute today!

Restored Marstons Mills wetlands to lessen nitrogen pollution



MARSTONS MILLS --11/10/23 A cranberry bog at 948 River Road in Marstons Mills which is being retired and restored back into a wetland.

MARSTONS MILLS— In the headwaters of the Marstons Mills River, 78 acres of cranberry bogs and adjacent uplands are tucked in along Bog Road and River Road. The bogs have given up their berries this season, and await the next growing season. For that acreage, next season will be the last.

The land, purchased this summer by the Barnstable Clean Water Coalition and Three Bays Preservation with a [\$1.27 million] grant from the state Executive Office of Energy and Environmental Affairs, represents a shift in the landscape of Cape Cod cranberry farming.

Faced with increased competition, higher costs, lower prices, labor shortages, and climate change, some Cape farmers are selling their bogs. Some, ready to retire, are letting go of all their bogs. Others are selling a portion, then using the proceeds to retool for higher yield cranberry varieties on less land. Eager buyers wait in the wings, too, such as the Barnstable nonprofit that wants to restore bogs back to natural, wetland environments — to eliminate nitrogen pollution downstream.

"In the 1860s, 1870s, the cranberry bogs saved Cape Cod economically," coalition Executive Director Zenas Crocker said in November during a tour at the bogs. "Our hope is that, now, some of them will help restore Cape Cod environmentally."

The bogs purchased by the Clean Water Coalition and Three Bays Preservation are part of the Marstons Mills River ecological restoration project, which aims to reduce nitrogen flow downriver and ultimately improve water quality in the Three Bays estuary on the Cape's southern shoreline. The properties at 110 Bog Road, now owned

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by the nonprofit, and 710 River Road, privately owned, comprise the project, according to a document filed with the Barnstable Registry of Deeds.

The 710 River Road acreage is owned by Joe Keating. "Joe is a cooperative neighbor and farmer who has been very helpful with the project. The 'treated' water — post restoration —will continue to flow through Joe's land and swamp area, about 11 acres, as it does now," Crocker explained.

In theory, the native plants that once thrived in the bog areas, prior to cranberry growing, will be revitalized, and as part of their growth the plants will absorb nitrogen and thereby cleanse water before it flows south. The river's headwaters are just west of the coalition's newly acquired property on River Road, according to Crocker.

The return of cranberry bogs to natural wetlands on Cape Cod has already been undertaken on the Coonamessett River and Childs River in Falmouth. "But nobody has really done a full-on restoration with the main purpose being water cleansing," Crocker said.

Work could start as soon as 2025.

Why choose a bog restoration?

About 3 million gallons of water per day flow through the Marstons Mills bogs, and much of it is affected by groundwater that has become "contaminated by all of these houses" that are not connected to sewers, Crocker said.

"We tested the Marstons Mills River and found elevated antibiotics and elevated antidepressants. So we know without a doubt where all the nitrogen is coming from," he said.

Returning unused or unwanted bogs back to wetlands is preferable to abandoning them —where woody areas of invasive vegetation and scrub pine can develop. With the wetlands restored, he said, "you can treat this water here before it gets to the salt water." Three Bays estuary is severely degraded by nitrogen and bacteria resulting in poor water quality, impaired habitat, and closures of beaches and shellfish areas, according to the Association to Preserve Cape Cod. With nitrogen flowing down the rivers, every south-facing Cape Cod estuary is gradually being poisoned, "and nature reacts with big, big growth of algae" Crocker said.

In Popponesset Bay in Mashpee, west of Three Bays estuary, a layer of smelly black sludge on the bottom is the result of "decades of algae growing and dying, growing and dying," he said. That is why shellfish won't grow and why eel grass, a key component of a healthy estuarine habitat, won't grow, Crocker said. It may also be the reason there are larger, and longer-lasting jellyfish blooms, he said.

Slow the river down.

In an ideal future, the restored wetlands at the Marstons Mills project should have native plants like wool grass and cattails, a slow-moving, meandering river with beaver dams, shallow ponds and wildlife.

The water should move from the head of the river to the estuary in about 48 hours or more, rather than the five to six hours it takes now.

But how to make that happen?

Workers will fill drainage ditches used by cranberry farmers, grade bog surfaces, remove water control structures and reconstruct natural stream channels.

A backhoe will pull up the vestiges of cranberry growing on the bogs — a mat of sand and cranberry vines about two-to-three feet deep. Beneath that mat will be about 10 to 50 feet of peat moss, Crocker said. "The amazing thing is seeds from the plants from 150 to 200 years ago are still there and will germinate."

Those are the plants that are to be restored and nurtured in the project, and recruited to do the water cleansing.



The Marstons Mills project is just one example of a growing list of bog restorations on Cape.

"It is a major trend and for good reason — restoring cranberry bogs to their natural state benefits the environment, encourages the return of wildlife and rare species habitats and contributes to the health of our waterways," said Neal Price, a senior hydrogeologist at Horsley Witten Group, Inc.

The advantage of doing such restorations, he noted, is that they are relatively quick to do compared to sewering and septic system replacements and are "a huge benefit for relatively little money."

Horsley Witten Group most recently announced a townand-state partnership to restore the retired Chop Chaque cranberry bogs in Mashpee, a town-owned parcel, to freshwater wetlands.

Will this trend put cranberry farmers out of work?

Some cranberry farmers are glad to turn over their retiring bogs to restorations, but others are disheartened to see the Cape's cranberry fields diminished. They worry some of their brethren may feel pressured to bow out, and too much will be relinquished.

On the contrary, Crocker said conservationists want to work with the farmers who are transitioning away from farming or toward newer, less land intensive cultivars. "Farmers may say, 'I don't need that bog so much, I'm going to let it go.' We're saying, 'OK, if you're going to do that, what's the best way to restore that back to what is natural?" he said.



The Marstons Mills property at 110 Bog Road, with 60 acres, has an appraised value of \$537,500, according to town assessing records. The nonprofit bought about 47 of those acres, which Crocker said "comprise the heart of the restoration project." The sale by Erik Hamblin to the nonprofit for \$750,000 occurred June 29, according to registry records.

The nonprofit also bought [17] acres at 946 and 948 River Road for \$585,000 on the same day. Conservation restrictions held by the Barnstable Land Trust were recorded for all three properties on Aug. 24, according to the registry.

Price, with Horsley Witten Group, said land uses on Cape have changed significantly from 100 years ago. Cranberry cultivation, he said, was "clearly what the Cape was from the mid-1800s to about the mid '60s, before tourism was a thing."

Looking at old maps, he said, "you can see in the 1860s there were almost no cranberry bogs, and they were almost everywhere you looked in the 1930s." At one time, Price noted, the Quashnet River in Falmouth "was the largest and longest continuous cranberry system in the world."

When a farmer determines a bog can no longer be of use, he said, "we should embrace the opportunity when we have it."

Now there's grant money for retired cranberry bogs to be restored as wetlands, so bog owners get some money and towns get environmental restoration, Price said. "It's a win-win."

Heather McCarron writes about climate change, environment, energy, science and the natural world. Article originally published on December 10, 2023. Corrections identified in brackets.



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Mission Statement

Barnstable Clean Water Coalition 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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BCWC In The News

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Check out WBUR's two feature stories, which look at different solutions for Cape Cod's wastewater problem.



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Scientific American, a popular science magazine, also produced a video that looks at how we got here and puts Cape Cod's wastewater story into a national context.



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