

Wastewater Treatment on the Outer Banks

By Bill Fenner, Creative Environmental Systems, Inc.

Part One: Septic vs. Sewer Systems – Understanding Both

It is probably the last thing you want to think about concerning your home...wastewater. We don't even like to think of those two words, "waste" and "water," in the same sentence, much less the same word. We prefer the traditional "out of sight; out of mind" approach, and don't really like to think about it much after it passes the drain heading somewhere "down there." We want the waste to go away and want our water supply to be safe and plentiful. And all of this is pretty much taken for granted.

How we manage wastewater plays a major role in the way that Outer Banks homes and businesses affect our environment, our quality of life, and especially our water supply. Beginning with this article, I will explore the different wastewater treatment options available to Outer Banks residents.

But before we analyze the various options available today in wastewater treatment, we need to fully understand the basic science of this treatment and put this technology into terms that people can understand. Each time you flush the toilet or wash something down the drain, you create sewage or wastewater. You can't just dump it out the window: it smells, it contains harmful bacteria, and it contains certain solids and chemicals that are detrimental to the environment. So, we require some form of treatment before reintroducing wastewater to the environment.

In early days, the treatment of wastewater was focused on protecting public health: treat it and keep it away from people. Now, we also realize the need to focus on protecting the environment in addition to our need to protect the public health. This presents a completely different set of challenges in the treatment processes.

Wastewater treatment is generally divided into two main types of systems: private, on-site systems and large treatment systems that centralize the process for a community development or an entire town. Individual septic systems are the most common on-site system and are widely used throughout the Outer Banks. Septic tanks and their accompanying drain fields were originally designed for rural areas where houses were spaced far apart so that a sewer system would be too expensive to install. Septic tanks were never meant for communities where houses are close together.

Environmental protection and public health agencies are becoming increasingly concerned with ground and surface water contamination from wastewater pollutants released by a neighborhood of septic systems. Toxic compounds, excessive nutrients, and bacterial agents are among the potential negative impacts to the environment from on site septic systems. Septic tank systems are not the ultimate answer, yet we regularly add more houses with septic systems to already mature neighborhoods.

With septic systems, wastewater leaves your home and enters the underground septic tank, which is essentially a storage unit, from an inlet pipe and exits through an outlet pipe. Inside this tank,

lightweight solids like fibers, hair and grease float to the top and sediment that sinks goes to the bottom of the tank. Naturally occurring anaerobic (without oxygen) bacteria start breaking down and digesting the waste in the tank. Typically a septic tank removes only 20 to 25% of the contaminants in the wastewater. The clearer wastewater in the middle layer is dispersed through perforated pipes into the drain field. Aerobic bacteria (with oxygen) in the soil provide additional treatment. The soil also acts as a physical filter as the wastewater effluent passes through the soil the solid particles are trapped and held in the soil.

Proper septic tank treatment requires adequate space and soil content for this process to work properly. Here on the Outer Banks, homes are very close together and the sandy soils do not retain the wastewater long enough to ensure proper biological treatment.

The Town of Nags Head has taken the lead locally by providing a financial incentive to encourage homeowners to have their septic systems inspected and serviced regularly. This is a positive step, because most homeowners do not realize that their septic systems need periodic professional inspections and servicing. Regularly someone on the Outer Banks comes home to find brown, swampy puddles in his yard. As he puzzles over the brown ooze, a neighbor strolls by and identifies the problem: “Looks like your septic system went.” But sometimes septic systems fail and we don’t see anything on the surface. Septic systems are much more than a simple underground tank that makes wastewater disappear.

While no beach town has a municipal sewer or wastewater treatment system, there are several small community or cluster systems that provide greatly improved wastewater treatment for these homes. These systems have a collection system which takes the wastewater from the home to a central processing plant which is more efficient and effective in its treatment than septic systems. Here wastewater is separated from the solid waste, treated, disinfected, and then safely returned to the environment. Communities like The Currituck Club, Ocean Sands, The Village at Ocean Hill, Pine Island, the Villages at Nags Head and the Villas in Nags Head are examples of communities that built these systems for their homeowners.

So how do we best protect our fragile environment when we already have so many small lots that will be developed with on site septic systems? If central sewer-wastewater treatment systems may not be the answer, is there a viable alternative? Yes! And in our next discussion we will look at the alternative systems available to provide higher levels of treatment to on site systems and the impact of these systems. We will investigate secondary treatment, cluster treatment, and re-use treatment. Each of these options is a potential solution for homes and communities on the Outer Banks.

By Bill Fenner



Bill Fenner—is a registered Professional Engineer with extensive experience in engineering and building water and wastewater plants and systems. A resident of North Carolina since 1989,

Bill is a graduate of North Carolina State University and is currently associated with Enviro-Tech, a North Carolina water and wastewater management and operations company.