

Wastewater Treatment on the Outer Banks

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Part Two: Primary, Secondary, and Cluster Treatment Systems

In Part One of this series, we took a brief look at the different options available to treat wastewater here on the Outer Banks today. In Part Two, we want to take a more in-depth look at three basic options – primary treatment, secondary on-site treatment, and cluster treatment systems. In Part Three, we will take a closer look at reuse quality treatment and why this system is gaining such popularity. And in Part Four, we will discuss some of the innovative approaches to wastewater treatment that may be our solutions for the future.

People generally think of wastewater treatment in one of two distinct categories. First, there is the septic tank system providing some degree of treatment for one house or business, and then there is the large municipal system that collects the wastewater and transports it a ways away to a large, central treatment system that traditionally discharge in our nearby rivers, lakes and sounds. Most people don't realize that often the ultimate solution lies somewhere between these two alternatives....a system that combines the best of both worlds.

Most homes on the Outer Banks have primary treatment in the form of a septic tank system. And unfortunately, that is the extent of the treatment for the waste from their house. Following the well-known and often-followed "out of sight, out of mind" theory that most homeowners have toward wastewater (everything that goes down the drain and down the toilet in your house or business), once it leaves their house it no longer is their problem and nature miraculously whisks it away. We tend to think of this large planet on which we live and the small amount of waste that we are putting into it and think that our little drains and toilets can't make that much difference. Individually "you" may not; but collectively "we" do have a tremendous impact on the environment.

A tank septic system, the most basic system in general use today, takes household waste into a holding tank and then disperses it into a drainfield or series of subsurface trenches on the property. This system depends primarily for the septic tank to separate heavy solids and light material from raw wastewater. Waste in the holding tank separates into three layers: a top, soapy scum layer, a clear liquid middle layer, and a heavy, solid bottom layer. As more waste is deposited to the holding tank, clear liquid from the middle layer is pushed into a second tank, an overflow or seepage tank. The clear liquid then enters the drainfield, which acts as a natural biological filter.

Since the drainfield is installed underground, there is no real process for inspection or maintenance of this portion of the system, nor is there a method of measuring and evaluating the quality of the effluent or waste that is being treated by the soil. Performance is often taken for granted. [Again, I want to mention the program that the Town of Nags Head has implemented to encourage homeowners to have their septic tanks inspected and serviced regularly. This is very positive step that the Town is taking.]

Since the soil is the key filter in the septic tank system, the quality and conditions of the soil is most important. State and local health department regulations prescribe soil and site conditions along with design standards for septic systems which may include suitable soils, permeability or percolation rate, and the distance to surface water, groundwater, and other environmentally sensitive areas. While these standards may determine whether a site is build-able or not, acceptance of a site based on soil and site characteristics should not be considered assurance of long-term environmental protection.

The idea of treating wastewater to a secondary or better quality before discharging the waste into the soil is gaining support from an ever-increasing number of environmental and health professionals. Secondary treatment can be used to perform a variety of functions that enhance the existing septic system or can even replace the septic system and provide a complete, environmentally friendly treatment process for a home, group of homes, business or virtually any situation where better treatment of wastewater is needed.

Secondary treatment is gaining support because in part to the fact that we are running out of sites that are considered to be “good” for septic systems, or it may be due to the realization that we can do better. We have an obligation to do better and the technology to make it reasonably affordable.

In the past 10 years, a number of pre-engineered, prepackaged small wastewater treatment systems have been developed that allow subsurface dispersal of effluent on many sites that limits the use of septic-tank effluent. With the availability of these small, on-site treatment systems, almost any site has the potential for a residential or a commercial building if the owner is willing to pay the costs associated with the engineering, installation, and operation of such a system. Most of these on-site secondary treatment plants are of a “trickler” variety....where a specially created media filter is used to treat the contaminates and remove impurities as the wastewater “trickles” through the system. Where a septic tank is engineered to remove 15 to 20 % of the impurities in the water, these secondary treatment systems will remove 90 to 95 % of the waste material, discharging much cleaner and more environmentally friendly water.

There are several manufacturers of on-site secondary treatment plants that have been approved by the regulatory officials in North Carolina. These plants have been scrutinized by health and environmental officials and approved for use here in Eastern North Carolina and on the Outer Banks. Aquapoint of New Bedford, MA manufacturers the Bioclere unit which has been well received and is proving to perform well. Other manufacturers include Puraflo, which produces Peat systems that use an organic peat material as its’ trickling filter; and Advantax, which uses a fabric filter. These systems are all designed differently so some work better in some environments than others. Be sure to evaluate how a system works in your area, not just what a brochure might say.

The next step up the treatment ladder is the cluster system. Many communities are beginning to realize that to maintain the public health and the integrity of their ground and surface waters require innovative thinking and increased use of new scientific breakthroughs. There is a growing consensus that a “decentralized approach” may well be the best answer for many areas and applications. This concept for provides the increased treatment capability of a “central”

system without the requirement of having to transport the wastewater a long distance to a remote central treatment plant may well be the “best of both worlds.”

The typical cluster treatment system on the Outer Banks is found at large residential developments such as Corolla Light, The Currituck Club, Pine Island and the Villages at Nags Head. Each development has its own treatment facility plus its own collection system which transports the wastewater from the homes to the plant. Once treated, the water is then returned to the soil or, as is the case with the Currituck Club, is re-used as irrigation on the golf course. While the thought of wastewater being sprayed in the open spaces may make one a little squeamish, in reality this water is generally safer and cleaner than the water to which is being added.

Smaller clusters of from 3 to 16 homes can also be developed to give the homes and businesses in a given area the capability to have increased wastewater treatment. The possibility for the use of small cluster systems is limited only by the creativity of the engineers and system designers.

Clustering is generally more economically and environmentally sound than either primary/secondary stand alone treatment or the large, central municipal system. Clustering is able to utilize the advantages of each system while overcoming the disadvantages.

Clustering offers an advantage that many people have known, but don't like to admit: Clustering can separate the development issues of lot sizes and density issues, which in the past have used septic tanks and fields as a method of keeping lot sizes large and thus reducing density, from the issues of environmental safety and health. Many towns and counties have tried to keep septic tanks as the “treatment of choice” because the added requirements for drainage land and space helped keep lot sizes larger. These are two completely separate issues and should not be combined. Officials should determine the lot sizes and density factors that a community desires and stick with it. An official's or (public's) desire to keep lot sizes larger should not be using the requirements for a septic tank as a planning tool.

The most important objective of any wastewater treatment system should be to treat the wastewater to the best level economically possible before it is released or recycled back in to the environment. The scientific principles of wastewater treatment are well researched and well documented...it is not a guessing game; it constitutes scientific study and analysis. It is our duty to utilize this knowledge to the betterment of our communities and for the protection of our environment. Both growth and environmental protection CAN exist together.



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