Well and Onsite Wastewater Facts

or

The things your parents forgot to tell you about living in the country

FSN - 1 **Loudoun County Health Department** **July 2016**

Septic Systems

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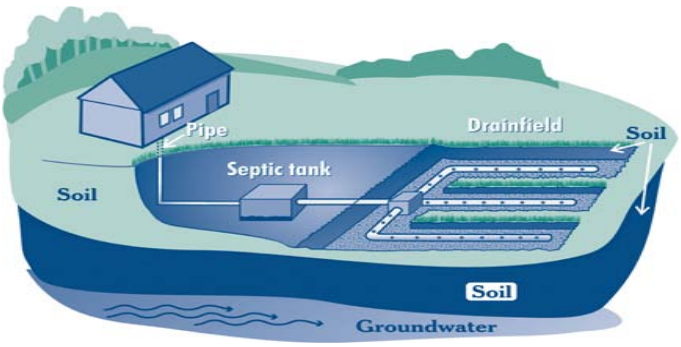
This is the first of a series of publications designed to provide the citizens of Loudoun County with information on the use and care of their well and onsite wastewater treatment systems. Although most people grew up learning to wash their hands when they finished going to the toilet because waste contained nasty things that could make us sick, often they never knew where the wastewater went. Out of sight out of mind was and continues to be the attitude of most people today.

Before the mid-1800's it was common practice to simply dump chamber pots and garbage into the street-side gutters, or cesspits in more rural areas. With the discovery of microorganisms in sewage that made people sick, it became a practice to sanitarily dispose of our sewage away from our living areas and often that was by sewers to a stream without treatment. Rural wastewater sanitation didn't change much and often outhouses were situated near a stream or lake. When the pit was full, the outhouse was moved and the pit covered with dirt. A few of these systems are still being used today in Loudoun County. In the 1930's, toilets and indoor plumbing became the modern standard for new homes and most older homes were retrofitted for a toilet and bath, provided the wastewater could be disposed of in a sanitary manner. In the late 1940's, this led to cesspools and septic tanks with leach fields in rural areas.

The main concern about the wastewater system was that the water went away and didn't come to the surface in our yard. When it did, we were told not to go near there. When a system surfaced it had failed and when land was plentiful, another system was built. There was little science to it. Often the system was put in the ground somewhere where it wasn't wet, without any testing of the soil. Often this soil was no better than that around the previous system and the new system failed shortly thereafter also. Many times this problem was "solved" by running a tile to a ditch or stream. In the 1970's we also discovered that the wastewater often continued to cause pollution by increasing the nitrogen levels of our drinking water, adding phosphorus to our lakes, or contaminating our drinking water or streams with pathogens. We have discovered that we cannot simply dispose of our waste, rather we have to *recycle* it back into the environment.

So how does a septic system recycle our wastewater back into the environment?
The septic tank is an anaerobic reactor. This means that there are tiny bugs –microorganisms – that can live where there is little or no oxygen in the water and love to eat organic material. They are slow eaters, which don't allow the waste to be consumed as fast as it is produced.



The septic tank also allows large materials to settle to the bottom of the tank. Scum and grease will float on the top of the wastewater. The dissolved organic material in the wastewater is allowed to flow out of the tank by a pipe and through a distribution box into several pipes that lead to the dispersal system (also called lateral field, drainfield or leachfield). This configuration is defined as a **conventional onsite sewage system (COSS)**.

Typically septic tanks today also have an "effluent filter" which is a screen device that restricts solids from going into the distribution system. The filter requires the owner to clean it periodically every 6 to 12 mos. It is critical to *have the septic tank pumped out every 3 to 5 years* so that neither the solids nor the scum will be forced out into the dispersal system, causing the pores of the soil to be plugged. Studies by the Environmental Protection Agency indicate that *septic additives do little to help a septic tank* and may harm the dispersal system. The dispersal system is typically a series of trenches in the soil filled with gravel. These trenches accomplish several things. First, they provide another area where other bugs – aerobic microorganisms that are much faster in decomposing the organic matter than anaerobic ones – can remove organic matter from the wastewater - cleaning it. Second, scientists have found that pathogens are removed in this area especially once a system has established itself. Third, they will provide some storage capacity for the wastewater when there are flows larger than normal such as when the laundry is done. Fourth, they distribute the water over a large enough area, based on the type of soil, to allow the water to seep through the soil and not back up out of the soil or into the house. The last treatment area is the soil itself. The soil both filters the wastewater and it provides millions of surfaces for microorganisms to attach to and treat the wastewater. Ultimately, the water is recycled back to the groundwater where it can be reused.

This process has its limitations. Removal of phosphorus is limited to the type of soil and the amount it can remove. Once that limit is reached it will continue to move into a stream or lake through the groundwater. Similarly, nitrogen cannot be removed by soil. Under certain conditions the microorganisms in the soil will convert ammonia to nitrate (most often) and nitrogen gas (rarely). Nitrate will flow with the water through the soil and may continue to pollute groundwater for drinking water or estuaries via our rivers such as the Potomac River Basin and Chesapeake Bay. Over the past 20 years Alternative Onsite Sewage Systems (AOSS) have been developed to enhance the ability of the microorganisms to function. These systems may provide additional treatment, a different dispersal system or both. AOSS have been developed that remove more than half of the nitrogen. When a high level of treatment is provided in an AOSS the amount of soil needed for a dispersal system may be reduced, thus allowing the repair and replacement of systems that failed in the past. AOSS dispersal systems allow for systems to operate where the water table is high and trenches cannot be used. They may also reduce the footprint needed for dispersal. They can open up land that would have been considered unbuildable until the sewers arrive. However, in most cases these are very sophisticated systems and require trained maintenance providers to look after them. When they are not well maintained they will fail much faster than a conventional septic system. The state of Virginia and Loudoun County both require an annual inspection of each alternative sewage system, to assure they are being maintained.

So what happens to all those solids that are pumped from the septic tank? They receive further treatment at a wastewater treatment works and subsequently are either land applied, land filled, or incinerated. The sewage handlers (septage haulers or pumpers) in Loudoun County take the waste to the Loudoun Water's Broad Run Wastewater Reclamation Facility, where it is further treated to meet state requirements. The biosolids (treated residuals from the wastewater treatment process) are recycled and applied to farmer's fields in lieu of fertilizer.