



Dealing With Septic System Impacts

Much of the watershed development that has occurred in recent years has been in more rural areas that are not served by central water and sewer. This trend is amplified by the fact that these rural lots are often much cheaper than their counterparts in dense municipal areas. In Maryland, for example, over 80% of the land developed in the last decade was located outside the “envelope” of water and sewer lines (MOP, 1991). A consequence of this development pattern is the need for land treatment and disposal of wastewater on individual residential lots—usually by some kind of septic system. Over time, hundreds and even thousands of septic systems are constructed in the developing rural landscape. As a result, watershed managers are faced with an enormous challenge: how to limit the cumulative impact of thousands of septic systems on the quality of surface and groundwater over many decades.

This article reviews the potential water quality impacts of both functioning and failing septic systems. In addition, it summarizes recent research and local criteria for siting septic systems to reduce failure rates, as well as innovative septic system alternatives that have greater pollutant removal capability. The importance of routine inspection and maintenance of septic systems is emphasized. Lastly, innovative local programs to improve the level of septic system maintenance are highlighted.

What’s a Septic System?

Septic systems are used to treat and discharge wastewater from toilets, wash basins, bathtubs, washing machines, and other water-consumptive items, which can be sources of high pollutant loads (Table 1). Septic systems are particularly common in rural or large lot settings, where centralized wastewater treatment systems are not economical. Nationally, one out of every four homes uses some form of septic system, which combined discharge over one trillion gallons of waste each year to subsurface and surface waters (NSFC, 1995). Because of their widespread use and high-volume discharges, septic systems have the potential to pollute groundwater, lakes and streams if located or operated improperly.

While septic systems are designed based on soil conditions, most are designed on the same principles (NVPDC, 1990). Conventional systems are comprised of a septic tank, a distribution system, and a soil absorption system (Figure 1). Variations of the basic design will be introduced later in this discussion. Wastewater is directed away from the building and into a below-ground septic tank. There, anaerobic bacteria digest organic matter, solids settle to the bottom, and low-density compounds such as oil and grease float to the water surface.

Partially-treated wastewater then leaves the septic tank and enters the distribution box, where it is discharged into the soil absorption system, also known as the drainage field. Effluent percolates through the soil

Table 1: Daily Water Use and Pollutant Loadings by Source (USEPA, 1980)

Water Use	Volume (liters/capita)	BOD (grams/capita)	Susp. Solids (grams/capita)	Total N (g/capita)	Total P (g/capita)
Garbage disposal	4.54	10.8	15.9	0.4	0.6
Toilet	61.3	17.2	27.6	8.6	1.2
Basins/Sinks	84.8	22.0	13.6	1.4	2.2
Misc	25.0	0	0	0	0
Total	175.6	50.0	57.0	10.4	3.5