



## TECHNICAL BULLETIN

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### Surface Water Diversions, Grading and Hydraulic Loading

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**Abstract:** *The performance and longevity of any onsite wastewater treatment system can be adversely affected by regular, sustained hydraulic loading in excess of daily design flow. Discussed below are certain design and installation techniques which can prevent onsite systems from being flooded by surface and/or ground water flows. Saturated conditions are detrimental to the function of the Advanced Enviro-Septic™ System, which relies on aerobic conditions to perform optimally.*

**Background:** Onsite systems are sized based on the expected amount of effluent they will treat on a daily basis, which is referred to as “daily design flow.” It is important to ensure that each system is adequately sized, taking into consideration the actual number of occupants (if this increases flows beyond the daily design flow) and whether the system will be subjected to additional loading from jetted tubs, water softeners, water purifiers, etc. The volumes of water utilized by such fixtures and appliances should be included in design daily flow calculations in order to size a system properly. Onsite systems are not designed to handle additional water from roof drains, foundation drains, sump pumps, irrigations systems, gutter systems, etc. Since the water from such systems does not require treatment, it can be safely dispersed in a location where it will not impact the onsite system.

**Common Causes of Excessive Hydraulic Loading:** While an onsite system can easily handle isolated, occasional surges in volume either of effluent or storm water runoff, prolonged dosing in excess of what the system was designed to handle can be problematic. Some common sources of excess hydraulic loading are sump pumps, drains or gutters discharging into or near the treatment field; ineffective surface diversion/swale installations; and leaking septic tank connections. Leaks in the building’s plumbing system can also result in overloading the onsite system and should be repaired immediately. Care should also be taken to ensure that the septic tank and all of its connections, access ports, risers, etc. are properly sealed and watertight to prevent ground water from infiltrating and overburdening the system.

**Redirecting Surface Water Flows with Diversions and Proper Grading:** In selecting the location of the onsite system, it is important to consider the surrounding topography and select a site where surface and subsurface waters do not naturally converge. Adequate soil cover material (loam/topsoil, minimum of 4 in. deep) must be installed above the System Sand; this cover material should be “crowned” to direct surface waters away from the system. Crowning is a very simple procedure: simply make the center of the system area the “high” point and grade the cover material so it gently slopes away from the center; keep in mind there will be some natural settling of cover material. We have found that poor final grading, or using less than the required amount of soil cover above a system, results in “pockets” which hold surface water, allowing it to infiltrate the system and possibly cause saturation. After final grading, the site must be seeded and mulched or sodded immediately to prevent erosion; only shallow-rooted vegetation such as grass or wildflowers should be planted above an onsite system. There should be no trees or gardens planted within ten (10) feet of the system.

Swales are another means of directing surface water away from the system. Swales are installed in undisturbed soil in order to intercept and divert surface water flows away from the system. They should be located a minimum of 10 ft. from the outer edge of the System Sand bed. Swales should be sufficiently deep to redirect surface water away from the treatment field effectively. While the industry trend has been to encourage long, narrow systems due to the

improved oxygen supply and infiltration, these systems can be more difficult to adequately protect from surface water flows.

**System Owner's Role:** It is important to explain these directives to the system owner; in many cases properly installed swales are filled in by homeowners or landscapers who do not understand how critical these surface diversions are to the onsite system's function. Homeowners should also be made aware of the importance of dispersing water other than wastewater away from the onsite system. Please recommend that all system owners obtain and read our Owner's Manual, which is available for download from [PresbyEnvironmental.com](http://PresbyEnvironmental.com).

**Conclusion:** Proper site selection, accurate sizing, and well-constructed surface diversions (grading and swales) are effective in preventing excess hydraulic loading to onsite systems. Prolonged saturated conditions compromise the function of all onsite systems and measures should be taken to redirect ground and surface water away from the treatment field. If you have any questions about the information in this Technical Bulletin, please contact Presby Environmental for technical assistance and further guidance.

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