

Septic Systems How They Work and How to Keep Them Working

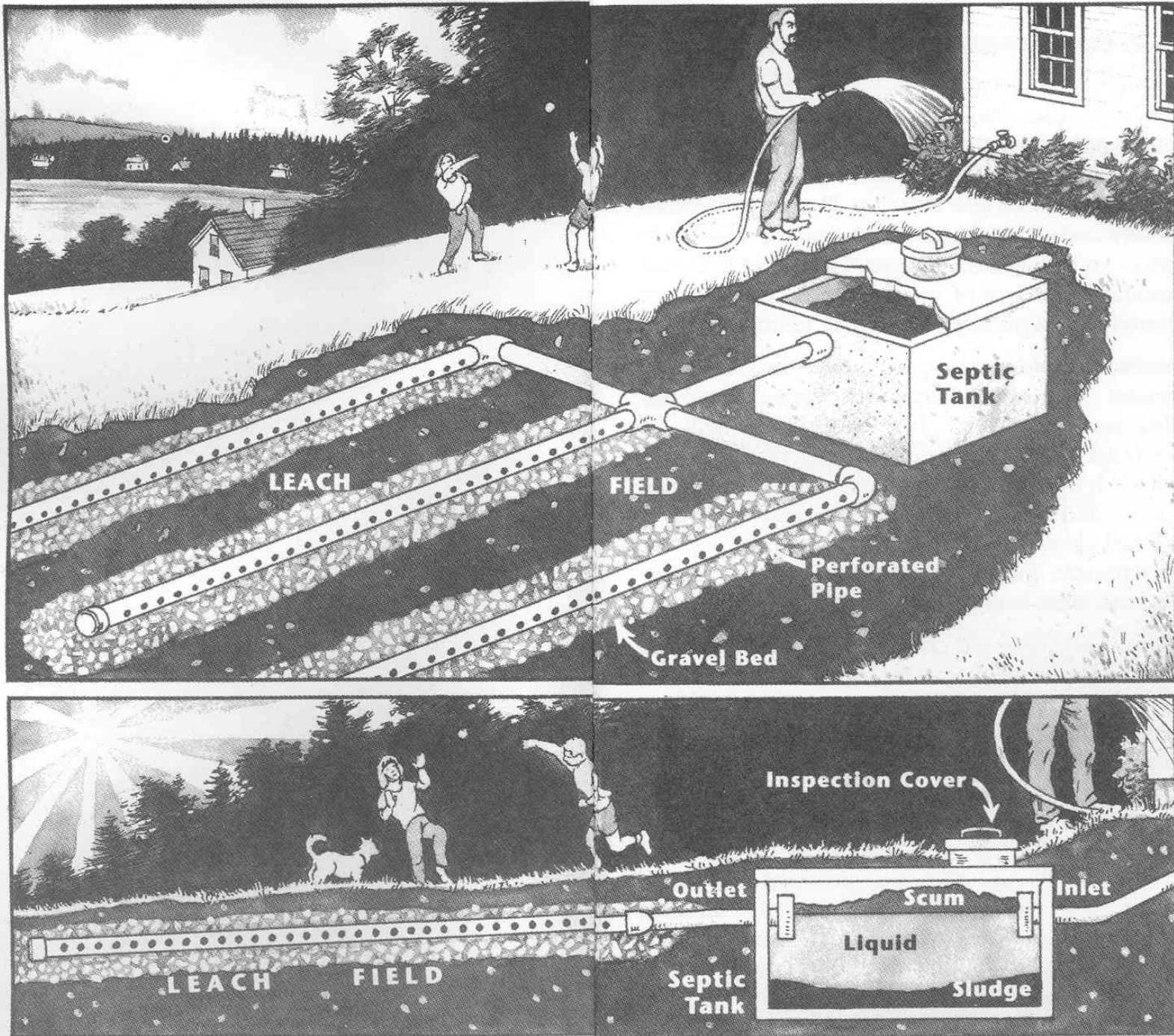


PO Box 9300, 49 Exeter Street, Portland, Maine 04104-9300
(207) 780-4820
www.cascobayestuary.org



201 Main Street, Suite 6, Westbrook, Maine 04092
(207) 856-2777
www.cumberlandswcd.org

**For the sake of Maine's
water resources, out of
sight shouldn't mean out
of mind.**



What is a Septic System?

A **septic system** is a sewage treatment and disposal system buried in the ground. It is composed of a **septic tank** and a **leach field** or trench.

Household sewage (**wastewater** from sinks, toilets, showers, washing machines, garbage disposals and dishwashers) generally flows by gravity into the septic tank. There, heavier particles settle to the bottom and scum rises to the top. Bacteria in the tank help break down some of the solids.

Baffles within the tank improve sludge settling and prevent scum from floating out of the tank. **Effluent** (liquid) flows to the leach field, where it is distributed over crushed gravel or absorbent soil.

The liquid typically includes contaminants such as nitrates, phosphorus, disease-causing bacteria and viruses, dissolved metals, detergents and solvents. The septic tank and leach field provide minimal treatment for these contaminants. Generally, phosphorus and dissolved metals are bound up by the soil; although, sand and gravel may not effectively remove these pollutants. Nitrates and solvents are diluted in groundwater. Bacteria and viruses are filtered by the soil or die off.

But septic systems can fail due to poor design or construction, to overloading or to inadequate maintenance.

Environmental Impacts

Improperly functioning and overloaded septic systems are major sources of water pollution. Failing septic systems leak harmful pollutants, like bacteria and excess nutrients (nitrogen and phosphorus), into groundwater. From there, pollutants make their way into lakes, streams, rivers, and coastal waterbodies.

Malfunctioning septic systems add excess **nutrients (nitrogen and phosphorus)** to nearby waters. In coastal ecosystems, nitrogen is the nutrient of greatest concern; whereas, in lakes, rivers and streams, phosphorus is the biggest threat.

Lake Contamination

Failing Septic Systems are the source of 5-10% of the **phosphorus** that reaches lakes. In a lake, increased phosphorus nourishes algae. When phosphorus levels rise, even by a small amount, algae multiply. The water becomes cloudy and green, leading to taste and odor problems, and dissolved oxygen levels are reduced, resulting in impacts to fish and other organisms that live there. As a result, lake use may decrease and property values can plummet.

About half of the phosphorus reaching a septic system is from **household cleaners**. Much of this phosphorus will be removed by a properly functioning system. But, if the leach field is clogged, for example, effluent may surface and flow over land to nearby streams and lakes. Or, if the soil cleansing process does not work properly, phosphorus may flow underground to nearby streams, lakes through groundwater.

Groundwater Contamination

The chemicals and organisms in untreated septic waste can be dangerous. Wastewater contains nitrates, which are particularly toxic to infants, and disease-causing bacteria and viruses. Wastewater also contains toxic chemicals from household products such as cleaners, spot removers, solvents, furniture polish, silver polish, bleach and pesticides. These chemicals and organisms may migrate through groundwater and threaten nearby wells.

Even the chemicals used in commercial septic system cleaners can be dangerous. Organic solvents travel through groundwater and can contaminate wells. Biological cleaners can plug up the disposal area and ruin the system.

Coastal Contamination

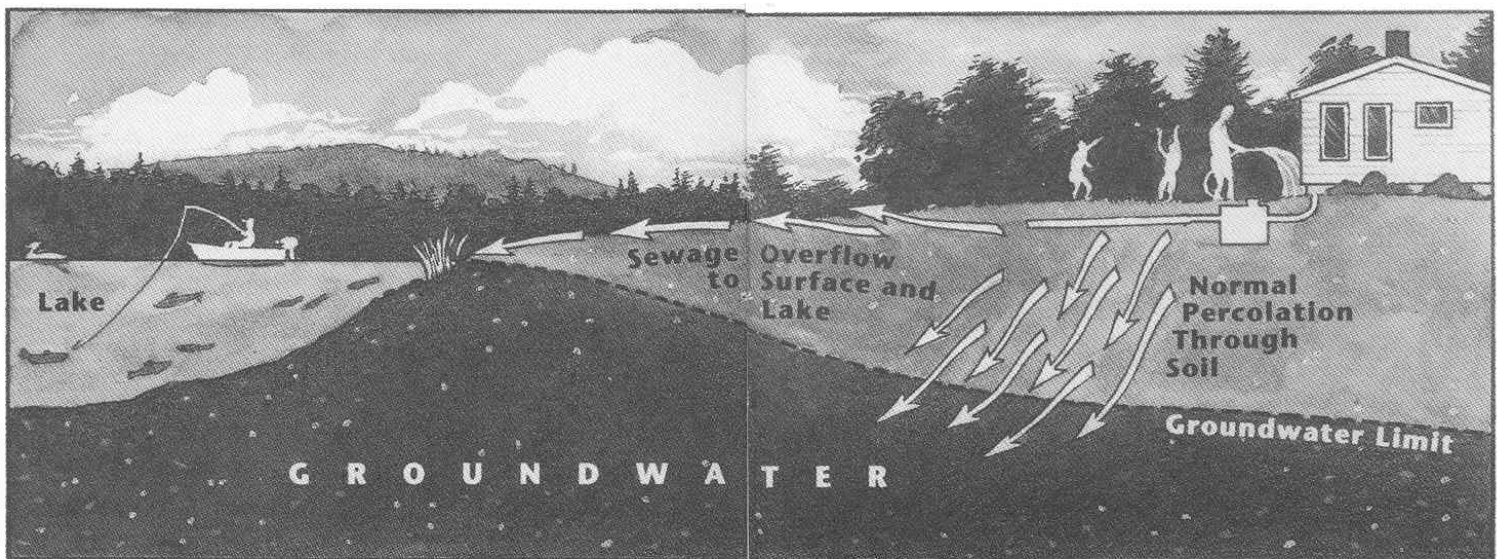
Nitrogen loading from failing septic systems can adversely affect Maine's coastal ecosystems. When too much nitrogen gets into the water, it disturbs the natural balance by allowing too much algae (microscopic plants) to grow. The algae cloud the water and block vital sunlight to underwater plants. When the algae die and decay, they use up much of the oxygen needed by fish and shellfish, often killing them. Special "denitrifying" septic systems designed to reduce nitrogen loading to nearby coastal waters are available.

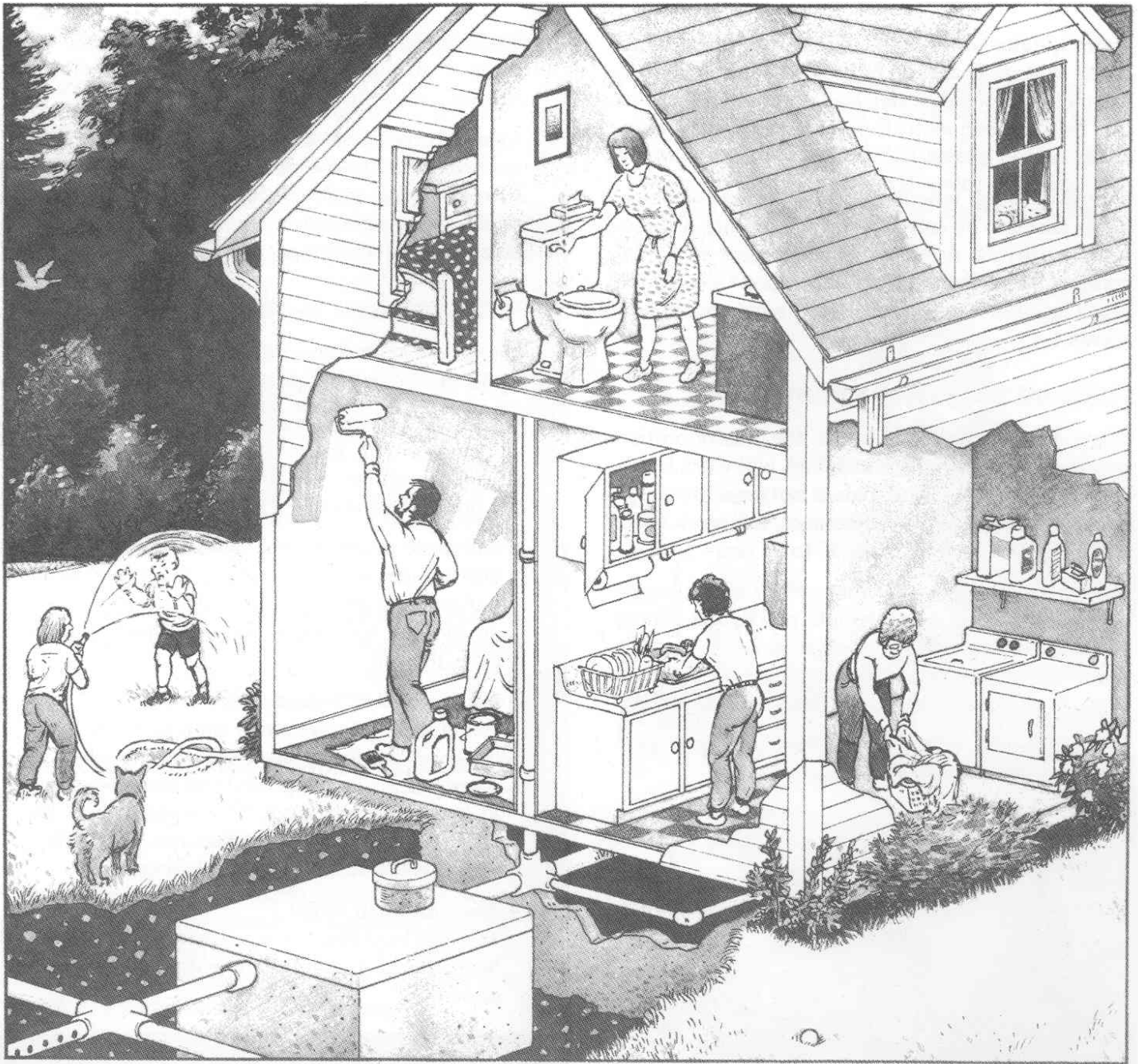
What Makes a Septic System Fail?

There are two primary types of septic system failure: **hydraulic** failure and **phosphorus treatment** failure.

Hydraulic failure occurs when the soil cannot handle the volume of wastewater, and as a result sewage overflows into the house. This is caused by:

- **Failure to pump out the tank.**
Wastewater will back up into the house or break out onto the ground when sludge and scum from an overfull tank flows into the leach field and clogs the soil.
- **Poorly sited or built systems.**
When the septic system is sited in or too close to the high water table, or is constructed with improper fill, saturated soil can cause wastewater to back up or break out. This is particularly likely to occur in the spring, when the water table is high.
- **Tree and bush roots.**
Tree and bush roots over a leach field can break or block pipes and interfere with the distribution system.





Phosphorus treatment failure occurs when coarse, sandy soils allow phosphorus to pass untreated through to the groundwater. In this case all the pipes and pumps are working properly, and there is no apparent evidence of malfunction. The problem lies in the inability of surrounding soils to absorb and treat the phosphorus.

Four Signs of a Failing Septic System

1. Sewage **odor** near the septic tank or leach field.
2. **Standing water** over the tank or leach field.
3. **Slow running** drains and toilets.
4. A patch of **bright green grass** over the leach field in the winter, or lush green growth in the summer when other grass is slow-growing.

All of these are signs of hydraulic failure. Unfortunately, for a phosphorus treatment failure, there may be no visible sign at all.

One way to tell if this is occurring is to test the drinking water in nearby wells. If a high level of phosphorus is found, a treatment failure may be occurring.

Foam in lake water and along the coast is usually *not* a sign of a failed septic system. Foam can be created naturally by the interaction of wind, water and decomposing plants and fish. It is frequently found on windward shores, coves and in eddies. One way to tell whether foam is natural or detergent-caused is by smell. Natural foam has a somewhat earthy or fishy aroma. Detergent foam, by contrast, has a noticeable perfume scent.

Preventing System Failure

Many homeowners are under the misconception that a septic system, once installed, will work forever without maintenance. This is not true! Most septic systems, even with maintenance, will work effectively for only an average of 15 to 25 years.

To help protect against premature failure, the homeowner can follow a few simple procedures. These procedures help reduce sludge build-up, reduce water use, eliminate toxic waste, keep the system's bacteria working and protect the leaching system.

To see if you are treating your septic system properly, review the checklists on the following pages.

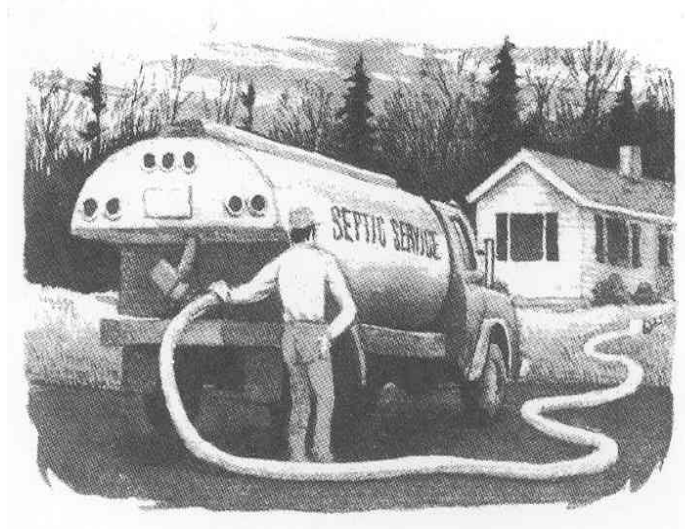
For Clogged Drains:

- ✓ Use a plunger or mechanical snake.
- ✓ Or pour one handful of baking soda and 1/2 cup of white vinegar down the drainpipe, and cover tightly for one minute. Repeat process as needed.
- ✓ Or pour 1/2 cup salt and 1/2 cup baking soda down the drain, followed by six cups of boiling water. Let sit for several hours or overnight, then flush with water.



DO Checklist

- ✓ **Do Inspect** your tank for signs of sludge buildup and make sure the baffles are in working order.
- ✓ **Do Pump** your tank as needed (every 2-3 years for year-round residences and every 4-5 years for seasonal residences), and keep a written record for yourself or future owner.
- ✓ **Do Compost** food garbage or put it in the trash.
- ✓ **Do Keep a grease can** handy.
- ✓ **Do Mark** your septic system so you can protect it from vehicles and encroaching trees and shrubs.
- ✓ **Do Conserve** water; install water-saving devices, such as front-loading washers and low-flow faucets and shower heads.
- ✓ **Do Use non-toxic cleaning products** such as baking soda to scrub toilets, or boiling water to clear drains.
- ✓ **Do Contact** a site evaluator if your septic system shows signs of failure; **contact** your local plumbing inspector if you see evidence of other malfunctioning septic systems.
- ✓ **Do Plant** shrubs, trees and grasses downhill from your system to act as a sponge (they will tie up excess nutrients and water as well as prevent soil erosion). Keep small trees and shrubs at least 10' away from your leach field and large trees at least 20' away.
- ✓ **Do spread out** your laundry loads to even out your water use and to avoid flushing your system.



DON'T Checklist

- ✓ **Don't use a garbage disposal**—it adds 50% more solids to your system.
- ✓ **Don't pour** automotive oil, cooking oil or grease down the drain.
- ✓ **Don't drive** vehicles over the septic system or leach field.
- ✓ **Don't plant** bushes or trees over the leach field.
- ✓ **Don't use too much water**, especially during rainy, wet seasons when the ground is saturated.
- ✓ **Don't pour** paint or paint thinner into your .
- ✓ **Don't use drain cleaners** and other toxic chemical products.
- ✓ **Don't use chemical or biological septic system cleaners**, which can plug up the leach fields and ruin your system.
- ✓ **Don't flush** feminine hygiene products, cat litter, disposable diapers or other non-biodegradable products into your system.
- ✓ **Don't flush** medicines, particularly antibiotics.
- ✓ **Don't use** products labeled “antibacterial.”



Other Tips

Regular septic tank pumping and inspection will prolong the life of your septic system. Keep in mind that a septic system costs less than \$300 to pump but \$12,000 or more to replace and can affect the resale of your property.

If your system shows signs of failure, is in coarse, sandy soils, or is within 100 feet of a lakeshore or stream, plan to replace it. In the meantime reduce your waste load, don't use a garbage disposal, and, if necessary, consider a composting toilet or similar alternative.

What to do if Your System Fails

- **Call the Maine Department of Health Engineering, at 289-5672.** They may refer you to your local plumbing inspector or a licensed site evaluator.
- **Exercise caution when working near an opened septic system.** Toxic and explosive gases present are hazardous. Never enter a septic tank!
- **Have your septic tank pumped.** This is a temporary solution, especially when it is combined with drastic water conservation.
- **Conserve water in your home.** This is particularly effective if your system has not failed completely. It can help lessen the problem for a short time.
- **Fence off the area.** If effluent is seeping to the surface, prevent people and pets from coming into contact with it.
- **Have a licensed site evaluator design a new system or an extension of your existing system.**
- **Connect to a community sewer system, if one is available.** Although the long-term costs may seem high, the benefit of reduced worry and lowered maintenance for the homeowner are often worth the cost.

What is a Watershed?

All septic systems located within a **watershed** have the potential to impact the associated waterbody. The land surrounding a waterbody that drains or sheds its water into the waterbody through streams, ditches, directly over the ground surface or through ground water. Because all land is part of a watershed, everyone lives in a watershed.

