SECTION 4
HOUSEHOLD WASTEWATER TREATMENT

This fact sheet addresses the impacts household wastewater treatment can have on water quality and how *you* can make a difference with ***Best Management Practices*** *(BMPs).* BMPs are actions you can take to protect our natural resources. **The ultimate goal of this information is to prevent water contamination from household wastewater.**

1. Read the facts and information in the following pages.
2. Fill out the risk assessment worksheets (p. 4-9) in order to analyze your individual situation.
3. Fill out the action worksheet (p. 4-12), then **take action!**

Introduction to Septic Systems

On-site ***wastewater*** treatment systems, commonly known as septic systems, treat sewage and wastewater from your household including showers, baths, sinks, and washing machines. All sewage and wastewater should flow into your septic tank, as they may contain diseases which can become human or environmental health concerns.

Conventional septic systems are the most common form of on-site wastewater treatment and, where soil conditions are suitable, the most desirable on-site system to use. Since the septic tank and drainfield are completely covered with soil, the system is not visible and odor is nonexistent as long as wastewater does not surface.

A septic system has two parts: the sewage tank and the soil treatment system (absorption/drainfield) (Figure 4-1). The most common sewage tank type is a septic tank that receives raw sewage from the household. Three layers form in the tank: solids settle to the bottom, and a layer of scum or grease floats on the surface of a liquid layer (Figure 4-2). As raw sewage is added to the tank, an equal amount of liquid flows out into the soil treatment system. Anaerobic bacteria within the tank begin breaking down raw sewage. The primary treatment of wastewater occurs in the soil, beneath the drainfield absorption area. This area is usually a series of trenches (laterals), each containing a distribution pipe embedded in drainfield gravel or rock. The effluent flows out through holes in the pipe, then down through the drainfield gravel or rock, and into the soil. The soil filters out remaining solids and pathogens (disease-producing microorganisms), and dissolved substances degrade as the wastewater slowly percolates through the soil to groundwater. These biological processes only work in soil that is not saturated with water.

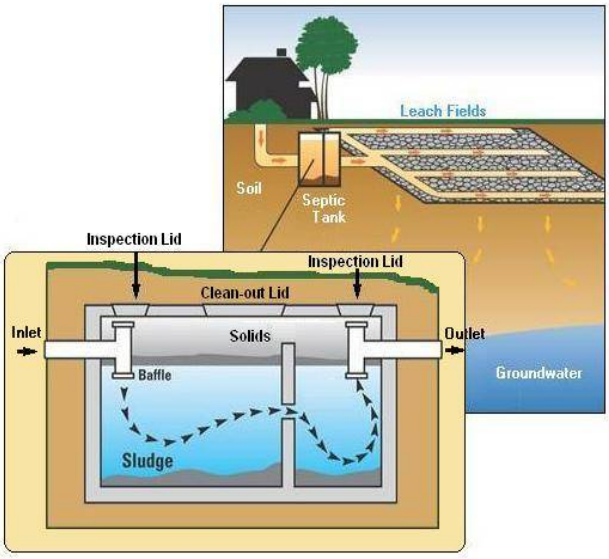

Figure 4-1. *Typical on-site household wastewater treatment and disposal system.*

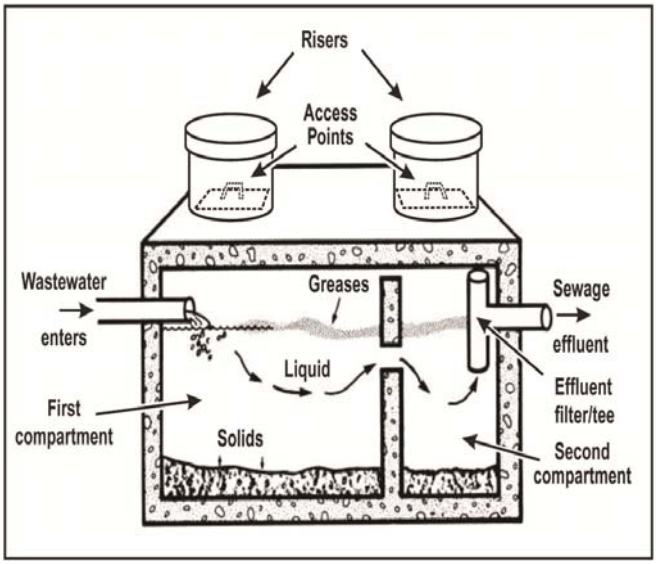

Figure 4-2. *Conventional septic tank.*

A special zone, called the biomat, forms in the upper 1 to 6 inches of the soil below the trench. This biomat zone is an important piece of the system that helps remove many of the germs and chemical pollutants. If too many solids accumulate in the septic tank, they can flow into the trenches and create a biomat that becomes too thick (Figure 4-3). When this happens, the biomat completely clogs the soil and does not allow the sewage effluent to flow out of the trench.

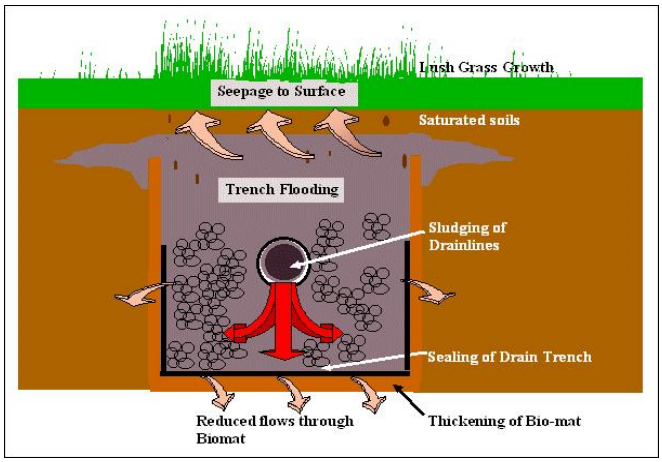

Figure 4-3. *Biomat thickening.*

Alternative Treatment Systems

Many types of wastewater treatment systems are available. A licensed Environmental Health Specialist (EHS) from Panhandle Health District (PHD) must evaluate the site to determine the system that is best suited to your site and needs. If PHD determines your property is suitable for an alternative treatment system, consider these options:

A **capping fill trench** is a standard drainfield trench constructed so that its bottom is between 3 inches and 2 feet into the natural soil. A selected fill material caps the trench to provide cover.

A **gravelless trench system** is a standard trench design except that the drain rock is replaced by either a large diameter, nylon fabric-wrapped plastic pipe or a plastic-domed chamber. Gravelless-domed chamber systems are awarded a 25% reduction in size if arranged in trenches.

Sand mounds are elevated pressure beds built with a mound of medium sand that treats effluent before percolating through the soil. **Specific soil requirements must be approved before these systems are used.** Contact PHD for more information (see Resource Directory, p. 4-7). Never install these systems in flood ways, areas with large trees and boulders, or in concave slopes, slope bases, or depressions.

Wastewater Treatment Systems within the Coeur d'Alene Lake Basin

- **Community Wastewater Treatment Plants (WWTP):** Either the entire wastewater stream from a household (including raw sewage), or just the effluent from septic tanks, is piped to a WWTP. Effluent from a WWTP may be discharged to a stream or river in which case a permit from the U.S. Environmental Protection Agency (EPA) is required. You may get a monthly or annual bill for this service.
- **Community Sewage Lagoons:** Typically, effluent from septic tanks is pumped (or gravity fed) to constructed lagoons for storage and treatment. Sometimes raw sewage is pumped to the lagoons. During the period from April to September, some systems apply lagoon water by sprinklers to land with crops for nutrient (nitrogen and phosphorus) uptake. Lagoon systems are regulated by the Idaho Department of Environmental Quality (IDEQ) and require an IDEQ permit.
- **Large Soil Absorption Systems (LSAS):** These are community systems where effluent from septic tanks is fed to an underground absorption/ drainfield system. A system is designated as LSAS when it receives more than 2,500 gallons per day (gpd) of wastewater (10 or more homes connected). These systems require a PHD permit with IDEQ engineering review. There are system requirements for maintenance, reporting, and alternating or reserve drainfields.
- **Community Drainfield Systems:** These typically service 3 to 9 homes with effluent flow less than 2,500 gallons per day (gpd). These systems require a PHD permit.
- **Individual On-Site Wastewater Treatment:** These systems are typically a septic tank with tank effluent going to an underground absorption/ drainfield system. Since the mid-1970s, these systems have required a PHD permit with soil percolation tests and specified separation distances to groundwater, surface water, and drinking water wells (Figure 4-5 on page 4-4). Prior to the mid-1970s, a PHD permit was not required, and older homes have been found to have drainfields very close to surface waters with minimal opportunity for soil treatment of the wastewater.

Why Worry About Wastewater?

If your home is near the waterfront, it is particularly important to have a properly functioning septic system. Surface water contaminated with septic waste is extremely hazardous to human health, wildlife, and our natural resources. Many septic systems are either old, unmaintained, or located too close to lakes, rivers, and streams.

Waste water contaminants include the following**:**

- **Bacteria and viruses** can cause disease in humans. These microorganisms are usually removed by settling or through treatment/filtration in the soil. Many die from aging or the adverse conditions in the soil absorption system.
- **Suspended solids** are composed of particles that are more dense (sludge) or less dense (scum) than water. Most can be separated from liquid waste by allowing enough time in a relatively calm septic tank. Grease and fats are also considered suspended solids. Soil absorption fields can be quickly clogged by wastewater high in suspended solids.
- **Organic chemicals** include cleaning solvents, paints, pesticides, and fuels that usually are not degraded or removed through treatment and can pass along with the wastewater into the water supply.
- **Inorganic chemicals** include lead from corroded piping, pesticides (herbicides, insecticides, fungicides, and rodenticides), and preservatives. These chemicals may seriously compromise your on-site treatment system. Household on-site systems are generally designed to degrade only biological contaminants. Inorganic chemicals introduced into your on-site system may harm the microorganisms that break down household wastes.
- ***Nutrients,*** such as ***Nitrogen*** from human wastes, and ***phosphorus*** from detergents and some chemical water conditioners are notable contaminants. ***Nitrate***-nitrogen is a common ground-water contaminant. Phosphorous can also contaminate surface water.

Failed septic system on a playground.

Health and Environmental Risks

Bacteria, viruses, and parasites in wastewater may spread hepatitis, dysentery, and other diseases. These disease-causing organisms, called pathogens, may make nearshore water unsafe for recreation. Flies and mosquitoes that are attracted to and breed in wet areas where wastewater reaches the surface may also spread disease.

High nitrate levels in groundwater, which is where our drinking water comes from, can result from inadequately treated wastewater. Excessive nitrate levels in drinking water can result in serious health problems for infants.

Synthetic cleaning products or other chemicals used around the house, which end up in the septic system, can be toxic to humans, pets, and wildlife.

Inadequate treatment can also allow excess nutrients to reach your lake or stream, promoting algae or weed growth. Algal blooms and abundant aquatic plants make the lake unpleasant for swimming and boating, and they also affect water quality for fish and wildlife habitat. As plants die, settle to the bottom, and decompose, they use up oxygen that fish need to survive.

A properly designed, constructed, and maintained system can effectively treat wastewater for many years. The following BMPs will help you prevent water contamination.

Installing a Septic System

Idaho has standards for septic systems. Before purchasing undeveloped property, evaluate whether it is septic-compatible. You don't want to be the unlucky person who invests in land only to find out the property cannot sustain a septic system. Call PHD for a site evaluation.

Once it has been determined that your property can sustain a septic system, you will need to identify the best possible location. Determining locations for septic and water wells should always be done before designing buildings or compacting soil. **Systems must be installed to meet all local codes and setbacks.** If the system fails to meet legal requirements, it may need to be replaced. Moreover, if your system is improperly located, designed, or constructed, contaminants may reach your well or surface water.

An individual soil absorption system is required to be at least 100 feet from any water supply, 20 feet from the foundation of the house, and 5 feet from property lines (Figures 4-4 and 4-5). However, separation distances of greater than 200 feet to water supplies are highly recommended because they provide greater protection to your drinking water supply.

Soil absorption systems are not suitable on some sites because of slow soil permeability, shallow depth to restrictive soil layer or bedrock, shallow water table depth, or other factors. Deep, well-drained, well-developed, medium-textured soils (such as silt loam and loam) are more desirable for soil absorption systems. Coarse, sandy soils allow effluent to flow too quickly downward to groundwater and do not provide adequate time for solids and pathogens to filter from the liquid. Unsaturated soils allow air movement, which helps keep the soil profile aerobic (oxygenated).

New Construction and Additions

When remodeling your home or cabin, expand the capability of your septic system to meet the new demands that will be placed on it. Preserve enough undeveloped space on your property for future expansion or replacement of the septic system. This expansion area must be left undeveloped.

Septic tank size is based on the number of bedrooms in the house. For one- to four-bedroom homes, the minimum septic tank size is 1,000 gallons. Each additional bedroom requires 250 gallons in additional volume. Appropriately-sized tanks have enough space for sludge to accumulate for an average of three years without needing solids removal.

PHD will identify the following site conditions:

- Depth to the highest known groundwater table or to bedrock
- Soil types and conditions
- Slope
- Setback requirements from wells, surface water, buildings, and property lines
- Septic system compatibility

	Building Sewer (feet)	Septic Tank (feet)	Drainfield or Absorption Bed (feet)
Well or suction line	Public: 100 Private: 50	Public: 100 Private: 50	100
Water pressure line	10	Public: 25 Private: 10	25
Water body	—	50	100-300
Dwelling foundation	—	5	Basement: 20 Slab or crawl -space: 10
Property line	—	5	5

Figure 4-4. *Minimum horizontal separation distances (measured in feet). *Distance measured to high water mark. Exact distance depends on soil type.*

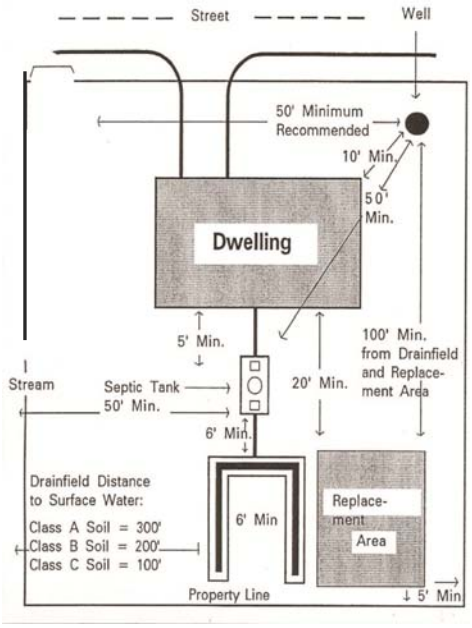

Figure 4-5. *Sample plot plan.*

Maintaining Septic Systems

For an on-site system to function over a long period of time, it needs to be properly designed, installed, and maintained. When all site-specific criteria have been met, the system will minimally impact surface or groundwater.

- Be cautious about adding chemical or biological additives to your system. Most researchers think additives provide little or no benefit. Remember that no additive can fix a system that has failed due to neglect and overloading.
- Have your septic system inspected annually to measure sludge and scum levels.
- Pump septic tanks every three to five years or whenever recommended by the licensed professional during annual inspections. Garbage disposal use, tank size, number of days the septic system is used, and the number of people using it will greatly affect when your tank needs to be pumped (Figure 4-6).
- Keep a grass cover over the absorption field, which will help use some of the nutrients available and aid in evapotranspiration.
- Never plant a vegetable garden over an absorption field. Microbes from the effluent may travel through the soil and contaminate the crop, especially root crops.
- Do not allow trees to grow over the system. Roots from the trees can cause damage to lines, as well as plug them.
- Safety around septic tanks should not be overlooked. The space within a septic system contains gases that are toxic when inhaled. Never go into or lean into a septic tank. Fatalities can occur from unsafe acts during septic tank maintenance and repair.
- Do not drive over an absorption field. Compaction from vehicles or equipment will cause settling, shifting, or breakage of lateral lines. This damage can lead to wastewater surfacing and create a health hazard.

When Do I Pump the Tank?

Pump the tank before it reaches 40% full of scum and sludge. When the tank is filled beyond this point, sewage has less time to settle and solids can pass through to the absorption field causing premature failure. Septic system maintenance needs to be done by a licensed professional who can determine if the tank needs to be pumped.

When the tank is pumped, have all components of the system checked: the baffles, potential tank leaks, and any needed repairs. Keep a record book on the system, and record all maintenance procedures.

Pumping frequency depends on the capacity of the septic tank, the flow of wastewater (related to the number of people in the household and water-use habits), and the volume of solids in the wastewater (more solids if a garbage disposal is used).

Tank Size (gallons)	Number of People Using the System					
	1	2	4	6	8	
900	11	5	2	1	<1	No. of yrs
1,000	12	6	3	2	1	
1,250	16	8	3	2	1	
1,500	19	9	4	3	2	

Figure 4-6. *Estimated tank pumping frequency in years.*

Septic System Failure

Signs your septic system may be failing include the following:

- Sewage is backed up in your drains or toilets; it may be a black liquid with a bad odor.
- Slow toilet flushing. If all toilets in your home are not fully flushing, this is likely a septic issue versus a plumbing problem.
- Wet areas or water seeping near a drainfield. The drainfield could be saturated if the weather has been continually rainy and cold. An odor may be present (Figure 4-7).
- Excessive growth of aquatic weeds or algae in the lake near your home. Incomplete treatment of nutrient-rich water seeping from your system promotes this growth.
- Unpleasant odors around your house. This may result from improper venting or a failing system.
- Bacteria or nitrates are found in your drinking water. This indicates a serious water contamination problem that may come from your own or a neighbor's failing system.
- Biodegradable dye flushed through the system shows up in nearby surface waters.

Call a professional to evaluate whether your septic system is the cause of these issues. If you determine septic failure to be the cause, follow the steps in Figure 4-8. According to the "Individual/ Subsurface Sewage Disposal Rules" (***IDAPA*** 58.01.03), "the owner of any failing system shall obtain a PHD permit and cause the failing system's repair."

Main Causes of Septic System Failure:

- Infrequent septic tank pumping.
- Overuse of water, especially from leaky faucets or continuously running toilets.
- Improper construction.
- Overuse of garbage disposals.
- Damage from excavation or from vehicles driving over system.
- Undersized septic tanks and drainfields.
- Tree and plant roots.

Figure 4-7. *Follow the guidelines for a failed system to protect human and environmental health.*

If Your System Fails, Take Immediate Action!

- Call PHD to help you evaluate the situation. If failure occurs on the weekend, and PHD is not available, go to the next step.
- Look for a septic specialist in the phone book or online.
- Rent a Port-a-Potty, and stop using water.
- Fence off the area to minimize contact with wastewater (for humans, pets, and wildlife).
- Don't use additives. Additives are of no benefit and may harm the system.
- Do not pipe sewage into ground or surface water. It is illegal.
- Do not pipe sewage into a sinkhole or drainage well because it can potentially pollute groundwater.
- If wastewater is surfacing near or above your drainfield, don't cover it with more soil. This does not fix the problem.

Figure 4-8. *It is imperative that you follow the guidelines above in order to protect human and environmental health.*

Conserve Water!

Reducing the amount of wastewater entering the system is important because lower flow (volume) equals better treatment, longer system life, and less chance of overflow. Excess flow is a principal reason for system failure (wastewater surfacing or backing up in house). Lower flow improves treatment by increasing the time waste spends in the septic tank, thus providing more time for solids to separate, settle, and decompose. Lower flow also means improved aeration and increased soil contact, providing better treatment in a soil absorption field. Every gallon you save in your house is a gallon that doesn't have to be absorbed by your drainfield.

Consider these tips for conserving water:

- Shorten shower times and choose showers over baths to minimize wasted water.
- Identify and repair leaking pipes, sticking float valves in toilets, and dripping faucets to reduce water waste. A dripping faucet can waste 15-20 gallons per day.
- Know where the water shut-off valve is in your home.
- Keep a container of drinking water in the refrigerator rather than running water until it's cold. While waiting for hot water at the sink, fill a container of cold water for use later.
- Wash only full loads in the dishwasher. Scrape, soak, or use the pre-wash cycle on your dishwasher rather than rinsing your dishes.
- Plug up the sink or use a washpan if washing dishes by hand.
- Wash only full loads of clothes, and use front-loading washers and suds-savers to save water. To avoid overloading your system, spread washing over the week instead of washing several loads on one day.
- Install low-flow aerators in all of your faucets.
- If you have an older toilet, convert it to a low-flow toilet with a displacement device.
- Replace older appliances and fixtures with newer, energy efficient models. Look for the WaterSense and Energy Star logos (Figure 4-9).

Items That Don't Go Down the Drain

Common sense is your best management practice to minimize the amount of contaminants going into wastewater. If you have to think twice about flushing or pouring something down the drain, *don't do it.* Remember, what goes down the drain doesn't just disappear, it ends up in our water.

- **Do not use the toilet as a wastebasket.** Don't flush facial tissue, baby wipes, diapers, tampons, medications, or any kind of plastic down the drain.
- **Eliminate the use of garbage disposals.** Ground-up garbage does not decompose easily, causes rapid buildup of solids in the tank, and may clog the drainfield's distribution pipes and soil pores. When building or remodeling, don't install a garbage disposal.
- **Toxic substances** such as household chemicals, cleaners, degreasers, acids, oils, paints, disinfectants, and pesticides, should never be put down the drain.
- **Use liquid laundry detergent, and use it sparingly.** Liquid is less likely to have fillers that may damage the septic system. Use phosphate-free detergents.

	Older Models	Newer Models	Most Efficient
Showerhead gallons per minute	5.5	2.5	2.0
Toilet gallons per flush	5	1.6	1.3
Dishwasher gallons per cycle	11-15	6-10	2.2-4.3
Washing machine gallons per wash	Top loading 40	Front loading 20-25	Front loading 10-15

Figure 4-9. *Replace older appliances and fixtures with newer, energy efficient models. Look for the WaterSense and Energy Star logos.*

Resource Directory
Household Wastewater Treatment

Panhandle Health District (PHD)
Kootenai County, Environmental Health
8500 N. Atlas Road
Hayden, ID 83835
(208) 415-5200

Idaho Department of Environmental Quality (IDEQ)
Coeur d'Alene Regional Office
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

Other Resources

Individual/Subsurface Sewage Disposal Rules
IDAPA 58.01.03
http://adminrules.idaho.gov/rules/current/58/0103.pdf

City of Coeur d'Alene
Phosphorous Laundry Detergent Ban
Chapter 13.28 - City Ordinance 2267 §1, 1990.
Prohibits the sale and distribution of laundry-cleaning products containing phosphorus in the City in order to reduce the introduction of phosphorus into public wastewater and into the Spokane River.

Web Soil Survey
U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) - soil information, maps, and data.
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

EnergyStar
www.energystar.gov

WaterSense
www.epa.gov/watersense

Risk Assessment Worksheets
Household Wastewater Treatment

Assessment Worksheet 1 - Septic System Design and Location

The assessment worksheet below will help you identify potential environmental risks related to your drinking water and the treatment of your home's wastewater. For each question indicate your risk level in the right-hand column. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished, turn to the Household Wastewater Treatment Action Worksheet on page 4-12 and record your medium and high-risk practices. The goal is to lower your risks. Use the BMP recommendations provided in this section to help you decide how to best reduce pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Capacity of system	My tank is designed to handle more wastewater than is required, based on the size of my home.	My capacity just meets load requirements, but I watch out for factors indicating system overload. I use water conservation measures.	I've added bathrooms, bedrooms, or water-using appliances without reexamining the capacity of my wastewater system.	☐ Low ☐ Medium ☐ High
Drainfield	My drainfield is over 100 feet from my well. Depending on soil type, the drainfield is between 100-300 feet from any surface water source.	My drainfield is 100 feet away from my well and surface waters.	My drainfield is less than 100 feet from the lake or a drinking water well.	☐ Low ☐ Medium ☐ High
Tank	My tank is more than 50 feet from wells and surface waters.		My tank is less than 50 feet from wells or surface waters.	☐ Low ☐ Medium ☐ High
Soil type	My soil is fine-textured like clay loams or silty clay.	My soil is made up of medium to fine sands, loamy sands, or silt loam.	My soil is coarse-textured like sand, sandy loam, or gravel.	☐ Low ☐ Medium ☐ High
Safety devices	An alarm is installed on the pumping chamber or lift station to indicate that the tank is full or power has been cut off to the pump.		No alarm is installed to indicate tank overflow or that power has been cut off to the pump.	☐ Low ☐ Medium ☐ High

Assessment Worksheet 2 - On-Site System Maintenance

Use the worksheet below to rate your risks related to maintaining the septic system. When finished, turn to the Household Wastewater Treatment Action Worksheet on page 4-12 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Age of system or holding tank	My system is 5 years old or less.	My system is between 6 and 20 years old.	My system is more than 20 years old.	☐ Low ☐ Medium ☐ High
Type of tank	I have a cement tank.	I have a steel or fiberglass tank.	I have a cesspool.	☐ Low ☐ Medium ☐ High
Condition of tank	My tank and baffles are inspected for cracks; repairs are made promptly.		I do not know the condition of my tank and baffles.	☐ Low ☐ Medium ☐ High
Tank pumping	My septic tank is pumped on a regular basis as determined by an annual inspection. The holding tanks are pumped as needed.	My septic tank has been pumped, but the date is unknown.	My septic tank has never been pumped. The holding tank overflows or leaks.	☐ Low ☐ Medium ☐ High
Drainfield protection	I keep vehicles and other heavy objects or activities away from the drainfield area.	Occasionally, the drainfield is compacted by heavy objects or activities.	I allow vehicles, livestock, heavy objects, or other disturbances in my drainfield area.	☐ Low ☐ Medium ☐ High
Diverting surface water	I divert all surface runoff away from the drainfield area.	Some surface water flows into the drainfield area.	All runoff from land, rooftops, and driveways flows into my drainfield.	☐ Low ☐ Medium ☐ High
Plantings over the drainfield	I have grass or other shallow-rooted plantings over my drainfield.		I have trees, shrubs, or vegetables growing on or near my drainfield.	☐ Low ☐ Medium ☐ High
Signs of trouble	My household drains flow freely. No sewage odors inside or outside are evident. My soil over the drainfield is firm and dry and my well water tests negative for ***coliform*** bacteria.	My household drains run slowly. Soil over the drainfield is sometimes wet.	My household drains back up. Sewage odors can be noticed in the house or yard. The soil is wet or spongy in the drainfield area. My well water tests positive for coliform bacteria.	☐ Low ☐ Medium ☐ High

Assessment Worksheet 3 - Septic or Sewage System Inputs

Use the worksheet below to rate your risks relating to system inputs. When finished, turn to the Household Wastewater Treatment Action Worksheet on page 4-12 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Solids	I do not use a garbage disposal. I do not dispose of bulky items (disposable diapers, sanitary napkins) in the toilet.	I sometimes use a garbage disposal.	I almost always use a garbage disposal, and sometimes dispose of bulky items in the toilet.	☐ Low ☐ Medium ☐ High
Dissolved solids (household chemicals)	I use household chemicals carefully (paints, cleaning products). I never pour solvents, fuels, or other hazardous chemicals down the drain. I do not use a water softener.	I sometimes pour diluted household chemicals down the drain.	I frequently pour diluted household chemicals down the drain.	☐ Low ☐ Medium ☐ High
Floatable solids	I do not dispose of cooking grease or oils into my septic system. I wipe off oil and grease from cooking utensils before washing.	I routinely dispose of grease or oils into my septic system and have made no attempt to reduce their disposal.	I always dispose of cooking grease or oils in my household septic system.	☐ Low ☐ Medium ☐ High
Water use	I use water conservatively and maintain my water fixtures regularly.		I do not use any water conservation measures. I have no water-conserving fixtures. Some of my fixtures are leaking.	☐ Low ☐ Medium ☐ High

Action Worksheet
Household Wastewater Treatment

Write all high and medium risks below.	What can you do to reduce the risks?	Set a target date for action.
Sample: Toilets frequently back up.	Have septic system inspected by licensed inspector.	Today