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 in order to analyze your individual situation.
3. Fill out the Action Worksheet, then **take action!**

Introduction to Septic Systems

The purpose of an on-site wastewater treatment system, commonly known as a septic system, is to treat sewage and wastewater from your household. Wastewater includes showers, baths, sinks, and washing machines. All of these 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 the breakdown of 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.

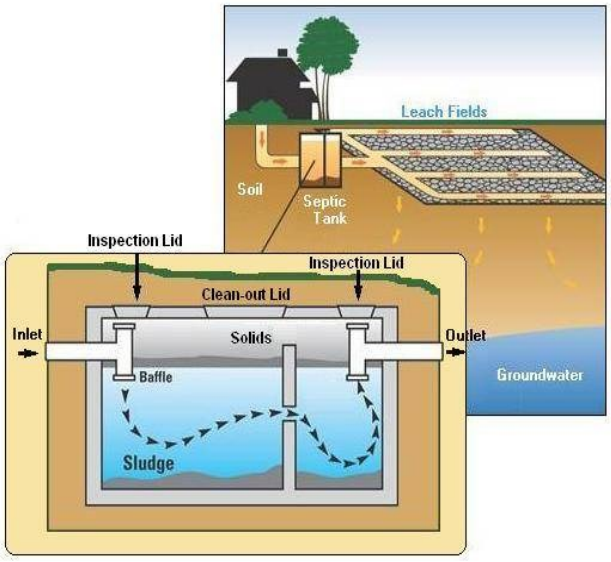

Figure 4-1 *Typical on-site household wastewater treatment and disposal system.*

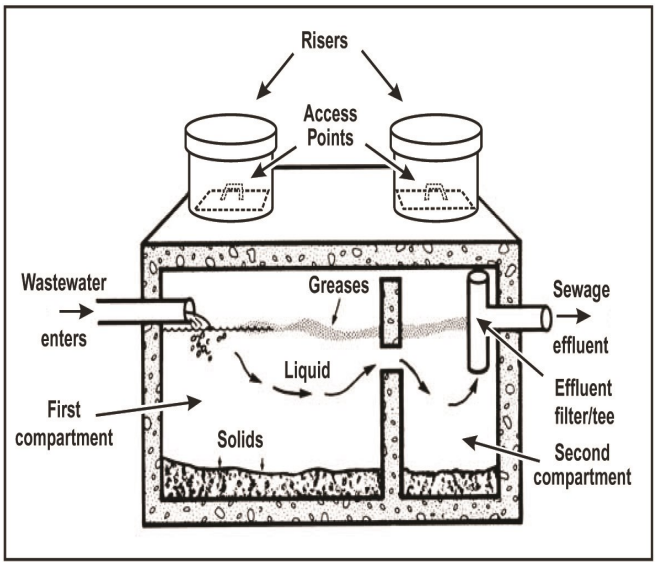

Figure 4-2 *Conventional septic system.*

A special zone, called the biomat, forms in the upper 1 to 6 inches of the soil at the soil/trench interface just below the trench bottom. This biomat zone is an important piece of the system as it helps remove many of the germs and chemical pollutants. If too many solids accumulating in the septic tanks 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.

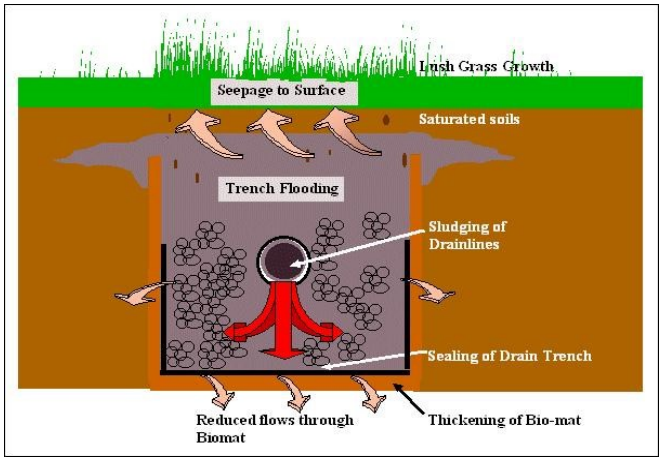

Figure 4-3 *Biomat thicken-*

Alternative Treatment Systems

There are many types of wastewater treatment systems. 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, here are some options they may suggest.

Capping fill trench is a standard drainfield trench constructed so that its bottom is at least three inches into the natural soil but less than two feet deep in the natural soil. A selected fill material caps the trench to provide cover.

Gravel-less 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. Gravel-less domed chamber systems are awarded a 25 percent 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**. There are very specific soil requirements for approval of these systems. Please contact PHD for specifics.** Must never be installed in flood ways, areas with large trees and boulders, in concave slopes, slope bases or depression.

Wastewater Treatment Systems

- **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. The effluent from a WWTP may be discharged to a stream or river in which case a permit from EPA is required. You will likely get a monthly or annual bill for this service.
- **Community Sewage Lagoons:** Typically, effluent from septic tanks are pumped (or gravity fed) to constructed lagoons for storage and treatment. Sometimes raw sewage is pumped to the lagoons. During the period of April – 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 homes and more connected). These systems require a Panhandle Health District (PHD) permit with IDEQ engineering review. There are system requirements for maintenance, reporting, and having alternating or reserve drainfields.
- **Community Drainfield Systems:** Servicing 3 to 9 homes with effluent flow less than 2,500 gpd. These systems require a PHD permit.
- **Individual On-Site Wastewater Treatment:** typically a septic tank with tank effluent going to an underground absorption/drainfield system. Since the mid 1970s these systems require a PHD permit with soil percolation tests and specified separation distances to groundwater, surface water and drinking water wells (Figure 4-5 on page 4-6). Prior to the mid 1970s a PHD permit was not required, and older built 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 the health of humans, wildlife, and our natural resources. Many septic systems are either old, unmaintained, or located too close to lakes, rivers, and streams.

Potential health risks are the most serious concern related to failing septic systems. 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.

Failed septic system on playground.

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.

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.

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 pages that follow will help you evaluate how you can best prevent water contamination.

Contaminants Found in Wastewater:

- **Bacteria and viruses.** Some can cause disease in humans. These microorganisms are usually removed by settling or through treatment/ filtration in the soil. Many will die from aging or the adverse conditions in the soil absorption system.
- **Suspended solids.** These are composed of particles which 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.** These include cleaning solvents, paints, pesticides, and fuels which usually are not degraded or removed through treatment and can pass along with the wastewater into the water supply.
- **Inorganic chemicals.** These 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.** Nitrogen from human wastes and phosphorus from detergents and some chemical water conditioners are the most notable nutrient sources. Nitrate-nitrogen is a common groundwater contaminant. In addition, phosphorus can contaminate surface water.

Maintaining Septic Systems

In order for on-site systems to function over a long period of time, they need to be properly designed, installed, and maintained. When all site-specific criteria have been met, there will be minimal impact by the system on surface or groundwater.

- Depending on the size of your tank and the use septic system inspected every year to make sure bacteria is sufficient and tank is not too full.
- **Additives -** Be cautious about adding chemical or biological additives to your system. Most researchers and experts think additives provide little or no benefit. It is important to remember that no additive can fix a system that has failed due to neglect and overloading.
- **Pump septic tanks every three to five years or whenever recommended by the licensed professional** during annual inspections. Use of garbage disposal, tank size, number of days septic system is used, and the number of people using it will greatly affect when your tank needs to be pumped (Figure 4-4).
- The importance of **safety** around septic tanks should not be overlooked. The space within a septic system contains gases, which are toxic when inhaled. Because of this, never go into or lean into a septic tank. Fatalities have occurred 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 can lead to the surfacing of wastewater, and the creation of a health hazard.
- **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.
- **Keep a grass cover over the absorption field.** This will help use some of the nutrients available and aid in evapotranspiration.

When Do I Pump the Tank?

Pump the tank before it is 40 percent filled with 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, and they can determine if your 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.

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

Tank Size (gallons)	Number of People Using the System				
	1	2	4	6	8
900	11	5	2	1	<1
1,000	12	6	3	2	1
1,250	16	8	3	2	1
1,500	19	9	4	3	2

Figure 4-4 *Estimated tank inspection and pumping frequency in years.*

Items That Don't Belong in the System

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 drainfields 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.

Conserve Water!

Reducing the amount of wastewater entering the system is important because less 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). Less flow improves treatment by increasing the time waste spends in the septic tank, thus providing more time for solids to separate, settle, and decompose. Less flow also means improved aeration and increased soil contact, providing better treatment in a soil absorption field.

Tips to Conserving Water

- Reduce water used for **bathing, laundry, and flushing the toilet**. Shorten shower times and choose showers over baths to minimize wasted water. A full bath uses 50-60 gallons, while a shower uses only about 5 gallons per minute. 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.
- Install low flow showerheads.
- Install low gallon per flush toilets.
- Keep a container of drinking water in the refrigerator. This saves having to run 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. Typical dishwashers use about 13 gallons for each wash. Newer models use 8-9 gallons.
- 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. A single load takes about 40 gallons.

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.

System May Be Failing If…..

Sewage is backed up in your drains or toilets. This 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 drain field. The drainfield could be saturated if the weather has been continually rainy and cold. It may or may not have an odor.

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.

If Your System Fails

Take immediate action!

Call Panhandle Health District. (208) 415-5100 They will help you evaluate the situation. If they are not available, go to next step.

Look for a septic specialist in the phone book. System failure may take place on the weekend when Panhandle Health District is unavailable. Don't wait!

Rent a Porta-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 no benefit and may harm the system.

Do not pipe sewage to the 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 soil absorption field (drainfield) don't cover it with more soil. This costs money and does not fix the problem.

Installing a Septic System

The state of 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 one hundred feet from any water supply, twenty feet from the foundation of the house, and five feet from property lines (Figure 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 movement of air, which helps keep the soil profile aerobic (with oxygen).

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, waterfront, buildings, and property lines
- Exact property boundaries
- Septic system compatibility

Conduct your own research by using:

- NRCS Soil Survey
  websoilsurvey.nrcs.usda.gov/
- Google Earth Maps
- Topographic Maps
  good indicator of potential drainage areas and slope issues.
- Assessor Maps

Component of System	Well or Suction Line	Water Line Pressure	Body of Water* or Stream	Dwelling Foundation	Property Line
Building Sewer	Public 100 Private 50	10	--	--	--
Septic Tank	Public 100 Private 50	Public 25 Private 10	50	5	5
Drainfield or Abs. Bed	100	25	100-300	Basement - 20 Slab or Crawl Space - 10	5

*Distance measured to high water mark. Exact distance depends on soil type.

Figure 4-5 *Minimum horizontal separation distances (measured in feet).*

New Construction and Additions

When remodeling your home or cabin, be sure to 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 present in the house. For one or two bedroom homes, the minimum septic tank size is 900 gallons. A three or four bedroom house is required to have a 1,000-gallon septic tank. Properly selected tanks have enough space for sludge to accumulate for an average of three years without needing solids removal.

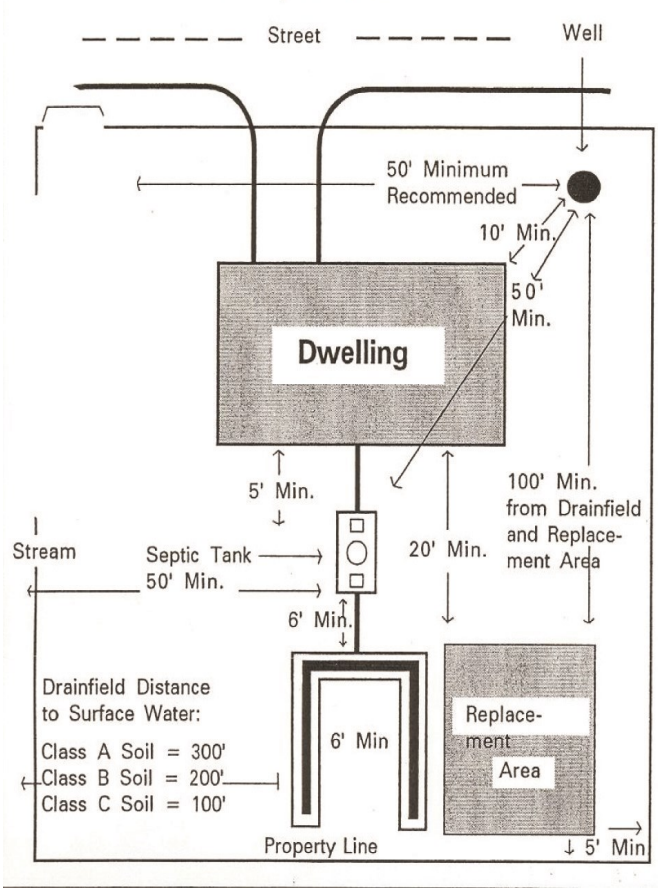

Figure 4-6 *Example plot plan.*

Resource Directory

Panhandle Health District
Bonner County Office
322 Marion
Sandpoint, ID 838864
(208) 265-6384
www.phd1.idaho.gov

Idaho Department of Environmental Quality (DEQ)
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422
http://www.deq.idaho.gov/

NRCS Soil Survey
www. websoilsurvey.nrcs.usda.gov/

RISK ASSESSMENT WORKSHEETS
Household Wastewater Treatment

Assessment Sheet : Septic System Design and Location
The assessment table 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 **Action Worksheet** on page 4-11 and record your medium and high-risk practices. Your goal is to lower your risks. Use the BMP recommendations in Section 4: Household Wastewater Treatment to help you decide how to best reduce pollution.

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

Assessment Sheet 2: On-Site System Maintenance
Use the table below to rate your risks related to maintaining the septic system. When finished turn to the **Action Worksheet** on page 4-11 and record your medium and high-risk practices.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Age of system or holding tank	System is five years old or less.	System is between six and twenty years old.	System is more than twenty years old.	☐ Low ☐ Medium ☐ High
Type of tank	Cement.		Steel or fiberglass.	☐ Low ☐ Medium ☐ High
Condition of tank	Tank and baffles are inspected for cracks; repairs are made promptly.		The condition of the tank and baffles is unknown.	☐ Low ☐ Medium ☐ High
Tank pumping	The septic tank is pumped on a regular basis as determined by an annual inspection. Holding tanks are pumped as needed.	Septic tank has been pumped but date is unknown.	Septic tank has never been pumped. The holding tank overflows or leaks.	☐ Low ☐ Medium ☐ High
Drainfield protection	Vehicles and other heavy objects or activities are kept from the drainfield area.	Occasionally, the drainfield is compacted by heavy objects or activities.	Vehicles, livestock, heavy objects, or other disturbances are permitted in the drainfield area.	☐ Low ☐ Medium ☐ High
Diverting surface water	All surface runoff is diverted away from the drainfield area.	Some surface water flows into the drainfield area.	Runoff from land, rooftops, driveways, etc. flows into the drainfield.	☐ Low ☐ Medium ☐ High
Plantings over the drainfield:	Grass or other shallow rooted plantings are over the drainfield.		Trees and shrubs are growing on or near the drainfield.	☐ Low ☐ Medium ☐ High
Signs of trouble:	Household drains flow freely. There are no sewage odors inside or outside. Soil over the drainfield is firm and dry. Well water tests negative for coliform bacteria.	Household drains run slowly. Soil over the drainfield is sometimes wet.	Household drains back up. Sewage odors can be noticed in the house or yard. Soil is wet or spongy in the drainfield area. Well water tests positive for coliform bacteria.	☐ Low ☐ Medium ☐ High

Assessment Sheet 3: Septic or Sewage System Inputs
Use the table below to rate your risks relating to system inputs.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Solids	No use of a garbage disposal. No disposal of bulky items (disposable diapers, sanitary napkins) in toilet.	Moderate use of garbage disposal.	Frequent use of garbage disposal unit. Disposal of bulky items very probable.	☐ Low ☐ Medium ☐ High
Dissolved solids (household chemicals)	There is careful use of household chemicals (paints, cleaning products). No solvents, fuels, or other hazardous chemicals are poured down the drain. No water softener.	Moderate disposal of diluted household chemicals.	Extensive disposal of diluted household chemicals.	☐ Low ☐ Medium ☐ High
Floatable solids	No disposal of cooking grease or oils into septic system. Oil and grease wiped from cooking utensils before washing.	Routine disposal of grease or oils. No attempt to reduce disposal of grease and oil.	Extensive disposal of cooking grease or oils in household septic system.	☐ Low ☐ Medium ☐ High
Water use	Conservative water use. Good maintenance of water conserving fixtures. No water softner.		Excessive water use. Leaking fixtures. No water conserving fixtures.	☐ 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