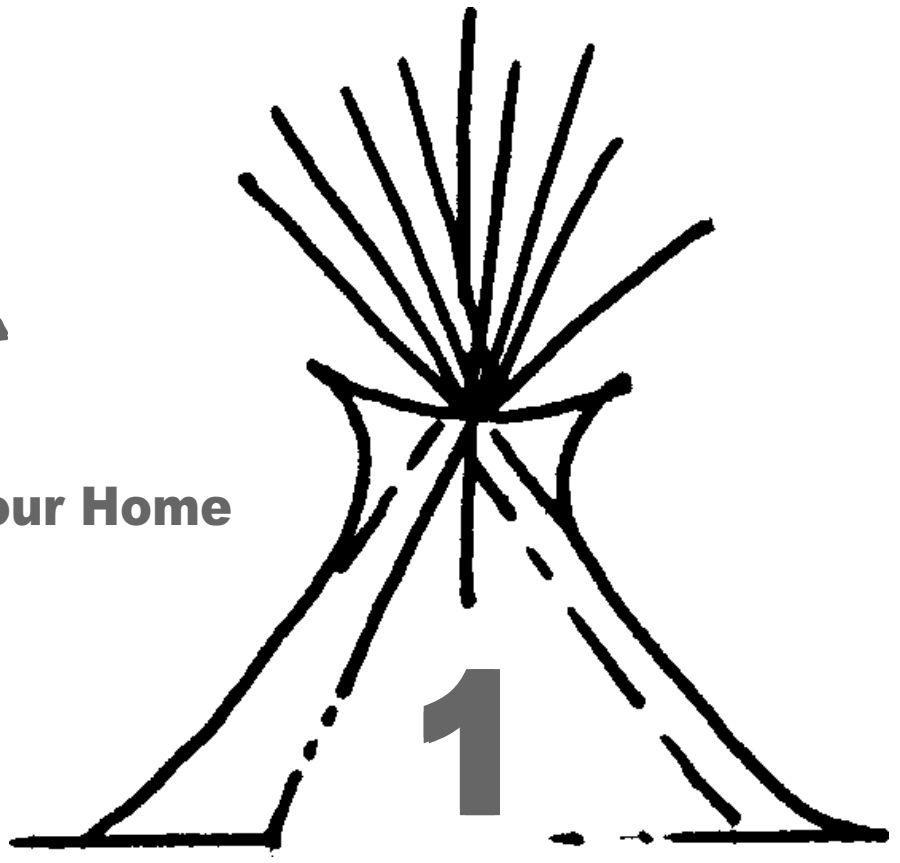
SITE ASSESSMENT

Protecting Water Quality Around Your Home



Depending on the soil conditions around your home, the way you live can affect your health and the health of your community. Does your soil drain quickly? Do you use or store hazardous chemicals?

This fact sheet tells how to make sure you don't harm the quality of the water you drink or pollute nearby streams and lakes.

1. Your Home's Surroundings: *Looking at soil type; depth to bedrock; depth to the water table; and location of wetlands, streams or other surface water.*

2. Making a Map of Your Homesite: *A map of your homesite showing buildings, roads and other surroundings can help you pinpoint health dangers.*

Connected to the Earth

If we keep everything in balance, we are in harmony with ourselves and at peace.

—Fools Crow, Lakota

Water quality terms

Catchment area: The landscape that catches rainfall and other moisture which then runs into surface water and goes into the water table.

Contamination: Pollution by chemicals, waste, or other substances that are unhealthy for people, animals and the environment.

Groundwater: Water below the surface of the earth that saturates the spaces between soil particles or fills the cracks in underlying bedrock.

Hydrologic cycle: The ongoing process of water falling to the earth and evaporating back up to the sky.

Impermeable: When something is impermeable, water cannot seep through (*permeate*) it.

Permeable: When something is permeable, water can seep through (*permeate*) it.

Saturation: When every space between soil particles and rock is filled with water, it is saturated.

Surface water: The water we see on the surface of the earth, such as lakes, rivers, ponds, ditches, etc.

Unsaturated: When every space between soil particles and rocks is *not* filled with water.

Water table: The underground level where the spaces between soil particles and all the cracks and spaces between rocks are saturated with water.

Watershed: The area that catches water and sheds it into lakes, streams and other surface water.

Wetland: A place where the water table is at or just below the surface of the earth.

Why is it important to look around your home for possible water quality hazards?

What you do in and around your home may harm the quality of the water that you and your family drink and pollute nearby lakes, streams or wetlands. What happens to your waste water and the water that sinks into the ground around your home? It depends on the type of soil and rock it meets.

This fact sheet will help you identify your homesite's soil type and geology and the depth to groundwater and surface water. It also invites you to draw a simple "aerial view" map of your homesite. Your map will help you note important locations and activities around your home that may pose risks to your health and the environment. Remember, this is just a starting point to help you complete the other risk-assessment fact sheets in this packet.

Examples of activities that may harm the environment or your family

1. Washing **spilled motor oil** and grass clippings into storm drains

2. Storing **gasoline and other hazardous chemicals** near children's toys

3. **Paving walkways** instead of using other material that would prevent runoff

4. Not separating **garbage** for recycling

5. Improperly adjusting sprinklers - **wasting water**

6. Planting flowers that may need **fertilizers** and **pesticides** around the water well cap

7. **Burning garbage,** which adds toxins to air that will eventually end up in the groundwater.

DO YOU KNOW?

Where your drinking water comes from?

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_____

What water resources you want to protect?

_____

_____

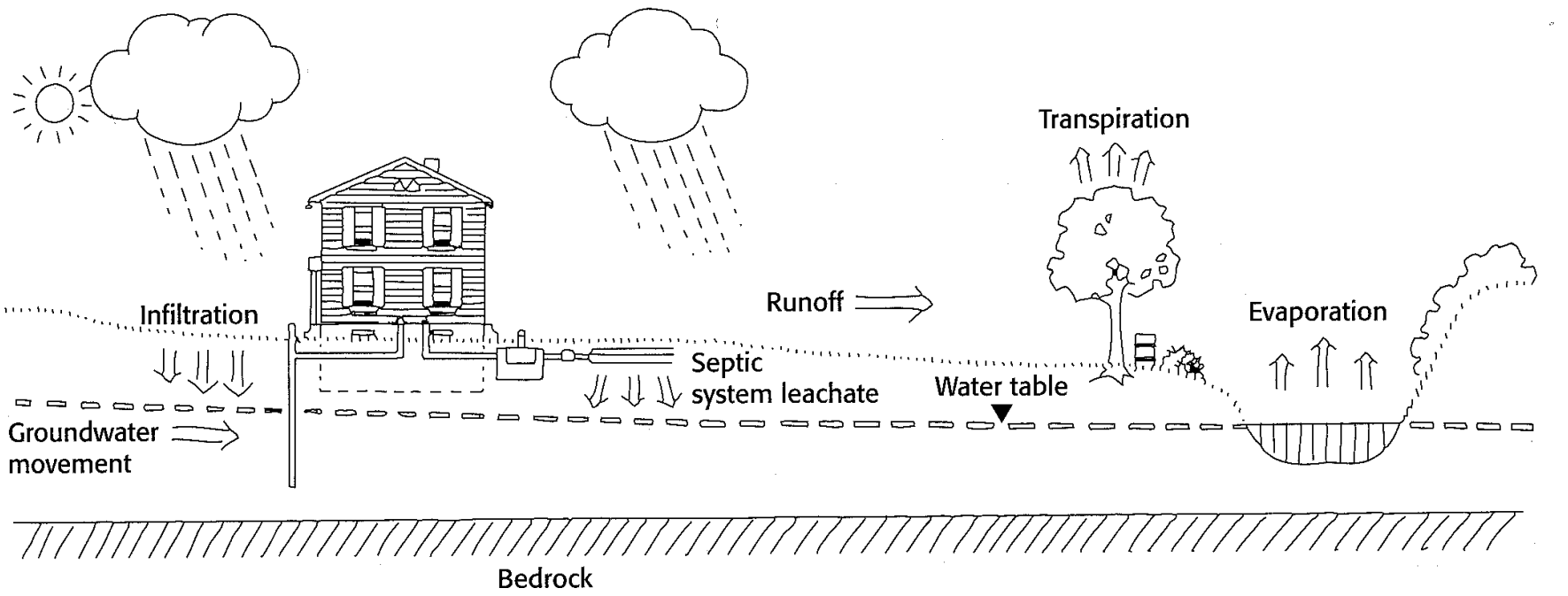


Figure 1.1 In the hydrologic cycle, water falls to the earth as rainfall and snow and returns to the sky.

What is a watershed?

The water from your faucet and the water in lakes or streams is part of a much larger water system. Not everyone lives next to a pond or stream, but we all live in a ***watershed***. A watershed is the land that collects the moisture that eventually ends up in a pond, lake, wetland, river or bay. Hills and valleys create the watershed, or "catchment" area, like a bathtub.

The hills and valleys that catch rain, snow and runoff are like the sides of the tub. When moisture hits the ground, it settles to the lowest place it can. As it moves it touches everything in its path–and sometimes contacts unhealthy pollutants. Water from the watershed drains to a network of rivers, streams, channels, storm drains, wetlands and the also the underlying groundwater.

Driving your car or fertilizing your lawn can affect water quality, even when you do it far from a lake or river. If you pay careful attention to what you do in and around your home, you can protect your watershed and the water you drink.

What affects my water quality?

The first step to safeguarding your water is to understand the natural setting around your home and the location of possible contamination sources. In the ***hydrologic cycle***, water moves through the air, over land, and through the soil (figure 1.1).

Soil type, depth to groundwater, and the distance from your home to surface water (like lakes and rivers) are all things that can speed up or slow down a contaminant's effect on water quality.

A lot of the things you do every day affect water quality. It is affected when you construct a new well or do maintenance to an existing well. When you use or store pesticides or fertilizer, maintain your septic system or dispose of your trash, it affects water quality. Soil erosion affects it too. Animal wastes are another threat, especially if large amounts of manure from horses, cattle, dogs, or other animals are allowed to pile up. To protect your water, you need to consider all of these things.

PART 1 • Your Home's Surroundings

Every home comes with its own unique set of physical site conditions. You cannot change these conditions, but once you are aware of them, you can change your activities to reduce risk to your water. At the end of this part is a table that will help you pick out possible risks where you live. When you have read the next two pages, you will be ready to complete the table.

SOIL TYPE

How does it affect water quality?

Soil is important in how water moves and where pollutants end up. Nearly all soils are ***permeable***–this means water and other fluids can seep through them. But different soils let water (and pollutants) seep through or run off at different rates.

Chemicals that you put on your lawn or wastes from a leaking septic tank can flow downward through the soil into groundwater or across the land into surface water, and water doesn't stop at property boundaries. For example: contaminants that enter groundwater through a neighbor's abandoned well can flow underground until they reach yours.

What is your soil type?

Soil is grouped into three basic types based on particle size:

- **clay,** which has small particles;
- **silt/loam,** which has medium particles; and
- **sand/gravel**, which has large particles.

You can get a good idea about your soil type by rubbing a moistened sample between two fingers. Is it sticky like clay, gritty and crumbly like sand, or somewhere in between like loam? Soil tests, which are offered through many Cooperative Extension offices, will also provide information on soil type.

How does soil type affect groundwater?

Groundwater is the water below the surface of the earth that saturates the spaces between soil particles or fills the cracks in underlying bedrock. The size of soil particles affects which pollutants are able to reach groundwater. Some soils are better at trapping pollutants than others.

- **Clay soils** are made of tiny particles that slow the downward movement of water and sometimes can stop it completely.
- **Sandy soils** allow for rapid water movement.
- **Silty soils** are somewhere in between clay and sand.
- **Soils made of large particles pose the greatest risk** because water seeps downward through them quickly without filtering out or decomposing pollutants.
- The ideal soil is a mix of middle sized particles (to allow infiltration) and tiny particles like clay or organic matter (to slow water movement and filter pollutants).

What are the risks to surface water?

Soil type can also affect surface water contamination. Although runoff occurs from all soil types, clay soils are more likely to cause surface water runoff. During a storm or flood, or even when watering your lawn, this runoff can wash contaminants from the land's surface into nearby streams and lakes. Eroding soil is also considered a water pollutant. Bare soil, especially on sloping land, can runoff into streams, rivers, lakes or estuaries.

What is your soil depth?

The **depth** of soil affects risks to groundwater. Usually, the deeper your soil, the farther water has to seep down before it reaches the groundwater. Deep soils have a better chance of filtering out or breaking down pollutants before they reach groundwater. Soils that are **less than three feet deep** present the highest risks for groundwater contamination.

How far down to reach bedrock?

Bedrock depth can be at the land's surface, just below the surface, or hundreds of feet down. The type of bedrock affects pollution risks. Shale, granites, and other ***impermeable*** types of rock can block the downward movement of water and contaminants. Other rocks such as limestone can be highly permeable, allowing water to seep freely into groundwater. When bedrock is split or fractured, water can move through it unpredictably, spreading pollutants rapidly over long distances.

How deep is the water table?

If you dig a hole, you will eventually reach soil saturated with water. The ***water table*** is the name for the boundary between the unsaturated soil (where spaces between soil or rock contain air, roots, soil organisms, and some water) and the saturated soil, or ***groundwater*** (where water fills all spaces). In a ***wetland*** the water table is at or just below the surface.

Your local water table changes throughout the year, but it is usually highest in spring and late fall. In general, the closer the water table is to the land's surface, the higher the risk of groundwater contamination. A water table that is **less than ten feet from the surface** presents a higher risk for groundwater contamination.

Groundwater and surface water are interconnected. Groundwater and surface water generally flow downhill and eventually go into rivers, lakes, springs, wetlands, bays, or estuaries. If you keep impurities out of surface water but do not protect groundwater (or vice versa) contaminated waters may happen where you least expect.

How can you find out what is going on underground?

There are several ways to find out about soil depth, bedrock type, and other features below the ground. Check your well-drilling records (if you have them), ask a neighbor who has a well, call a local well-drilling company, talk to your Extension agent, or call the local tribal office that gives permits for drilling wells. The Natural Resources Conservation Service maintains county soil surveys. The U.S. Geological Survey maintains groundwater maps.

Do table 1- Check the conditions of your homesite

The table below is similar to other tables you will find throughout the fact sheets in this packet. For each question, three choices are given that describe situations or activities that could lead to high, medium, and low risks to human or environmental health.

If you aren't sure of the answers, just do the best you can. For some questions, your well-drilling records, tribal housing records or local well drillers may be able to help. Some choices may not be exactly like your situation, so choose the response that best fits. Mark your risk level (low, medium, or high) in the right-hand column. If no choice applies, leave that line blank.

How to respond to risks

Don't depend on the physical characteristics of your soil, bedrock or other features of your land to protect water quality. You must take informed steps to prevent pollution. Although you can't change your soil type or the depth to bedrock, you can account for these factors and do things differently around your home to prevent environmental problems.

Pay special attention to the medium and high risks you marked on the table. Keep them in mind as you complete your homesite map and work on other fact sheets in this packet.

TABLE 1- Check the Conditions of Your Homesite

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Soil type and risks to lakes, rivers, wetlands, or other surface water from runoff	Sand / gravel (large particles)	Silt/loam (mid-size particles)	Clay (very tiny particles)	❒ Low ❒ Medium ❒ High
Soil type and risks to groundwater from infiltration	Clay (very tiny particles)	Silt/loam (mid-size particles)	Sand / gravel (large particles)	❒ Low ❒ Medium ❒ High
Soil depth	Deep (Over 12 feet)	Moderately deep (3-12 feet)	Shallow (Less than 3 feet)	❒ Low ❒ Medium ❒ High
Bedrock	Solid, not permeable or fractured	Solid limestone or sandstone	Fractured bedrock - any kind	❒ Low ❒ Medium ❒ High
Depth to water table	Over 20 feet	10-20 feet	Less than 10 feet	❒ Low ❒ Medium ❒ High
Nearness to surface water	Over 100 feet	25-100 feet	Less than 25 feet	❒ Low ❒ Medium ❒ High

PART 2 • Making a Map of Your Homesite

Why make a map?

By drawing a map of your homesite, you will take another step toward more fully understanding your pollution risks. Although your property has physical features you cannot change, there are many things that you can do to minimize risks. Your map will identify areas where you can focus your efforts. It will also assist you in completing other fact sheets in this packet. And if you involve children as you make your map and conduct the assessment, you will help teach them the importance of having clean water and your commitment to the environment.

The materials you need are inexpensive and easy to find:

- a measuring tape
- a clipboard
- a pencil
- the grid provided on the back page of this fact sheet

The map you create will be an aerial view-the way your property would look if you took a photo of it from the air. A sample map is provided below.

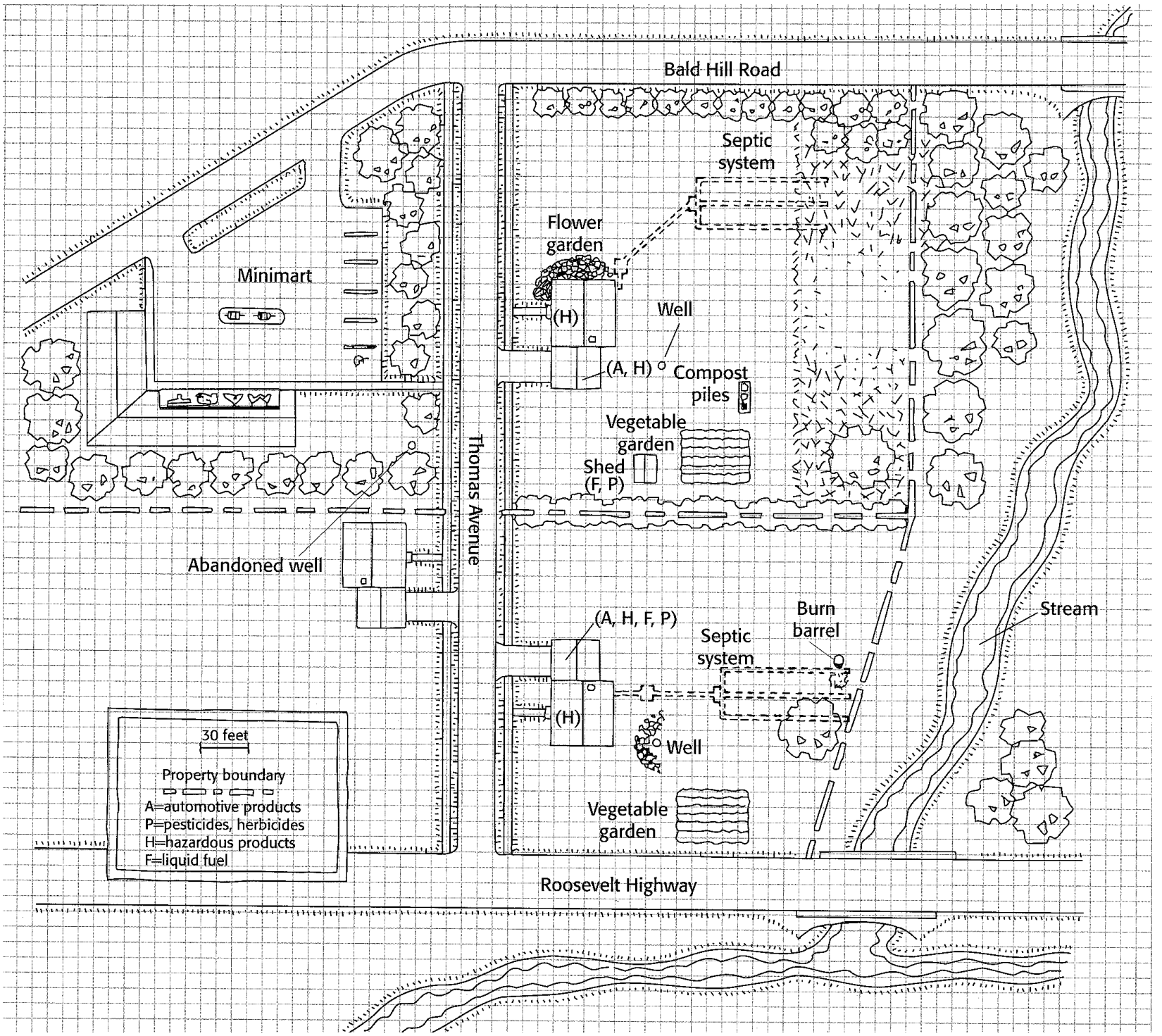


Figure 1.4 Sample homesite map (Use the graph paper on the back page to create your own map)

Sources of contaminants

Things you do and characteristics of your land could have major effects on water quality. As you look at your property to make your map, watch for:

- Improperly located or unmaintained septic system or cesspool
- Underground or above-ground storage tank containing fuel oil, gasoline, or other petroleum products
- Improperly constructed or abandoned well
- Stockpiled animal waste or animal pens, corrals, or kennels close to a well or surface water body
- Improper storage, use, or disposal of yard and garden chemicals and other hazardous products like paints and solvents
- Machine maintenance workshop near well
- Road de-icing materials that flow toward a well or nearby surface water body

Instructions for your homesite map

Make your map include these features:

❒ Property boundaries
❒ House and garage
❒ Outbuildings, sheds
❒ Septic system, drainfield
❒ Nearest surface water
❒ Water wells
❒ Dry or abandoned wells
❒ Heating oil or other fuel storage tanks
❒ Building perimeter drains
❒ Lawn areas
❒ Vegetable and flower gardens
❒ Other cultivated areas
❒ Animal waste storage areas
❒ Roads, driveways
❒ Drainage ditches
❒ Impervious surfaces (such as patios or sidewalks)

Use letters to mark hazard areas

On your map, note the areas where you store and use chemicals and other potential hazards with letters. Make up your own code letters or symbols as needed, like this example:

F = Fuel tanks for gasoline or heating oil

A= Automotive products like motor oil, gasoline, and antifreeze

P = Pesticides, herbicides

H= Hazardous products like solvents, acids, paints, and thinners

W= Waterway

Other map-making ideas

For larger-view maps, add landscape features such as hills, rivers, and ponds and human-built features such as runoff drainways, roads, and bridges. Mark possible sources of contamination beyond the boundaries of your property such as farm fields, dumps, and gas stations. Indicate seasonal changes at your homesite. For example, are there wet areas in the spring? They might indicate a high water table.

Don't leave out things you can't see

Find out about previous or current industrial or agricultural activities in the area. Check with tribal housing or other tribal offices for information. Old landfills and buried fuel tanks are just a few examples of what you might find. Find out if underground fuel tanks exist on neighboring properties. If there are tanks, septic systems, or other potential sources of contaminants uphill from your well, they could affect the safety of your groundwater. These issues will be discussed in-depth in the fact sheets that follow.

Putting It All Together

The **final step** is to put both pieces of your assessment together (**the assessment table and the map**) so you can find problem areas on your property. If you have rated any of the items in the table as medium or high risks and have identified potential contamination sources, you should be concerned.

For example, you may have identified an underground heating oil tank or realized that you apply lawn or garden chemicals within 25 feet of a lake or stream. Perhaps your soil is sandy or your gasoline storage tank is close to your drinking water well. Is there an old abandoned well on your property that isn't properly sealed? To protect your family's health, the environment and the value of your home, you will want to take steps to correct these problems.

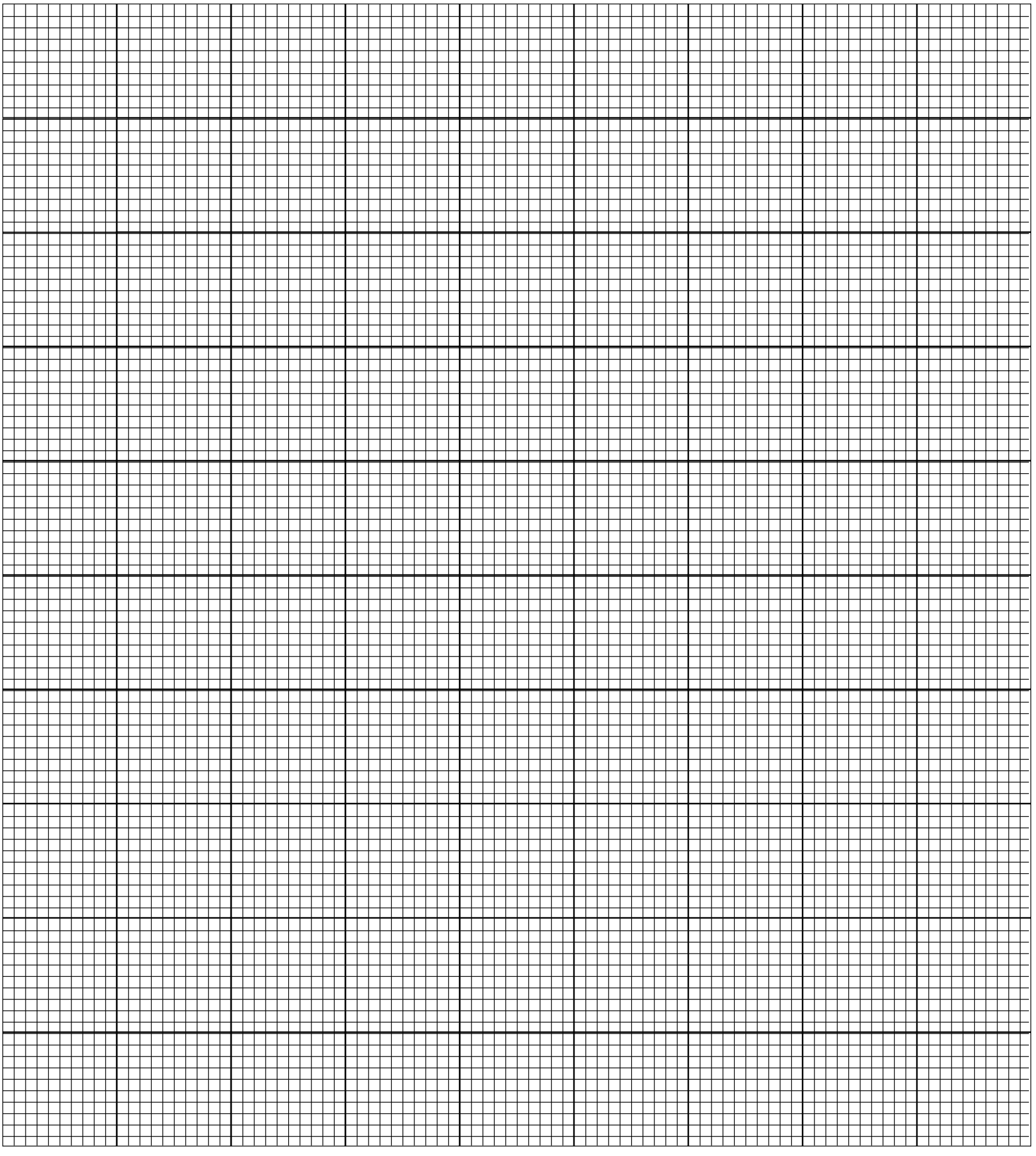
Taking Action:

If you identify potentially hazardous or unsafe situations, what should you do? Refer to the other fact sheets in this packet to focus on specific concerns and how to correct them. If you need more information, talk to your Extension agent.

Acknowledgments

This fact sheet has been revised from original prepared by Alyson McCann, University of Rhode Island Cooperative Extension.

Use this graph paper to make your own homesite map
(one square= 1/10 inch = 10 feet)



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To obtain additional fact sheets in the *Connected to the Earth* series, contact your local Extension office or call Montana State University's Extension housing program at (406) 994-3451.