Soils and Drainage

WHY SOILS MATTER

Think about how dependent you are on the land and its soils. Your house rests on it. Your trees root in it, as do your garden vegetables, flowering plants, and lawn grasses. The stability of your buildings and the success of your plantings depend on the nature of your particular piece of land and its soils. Gaining an understanding of what formed your soil will help you to make educated decisions on how to improve it.

WHERE DOES SOIL COME FROM?

The development of soil is a complicated process. Different kinds of rocks at or below the earth's surface — known as the bedrock or parent material — are weathered into fragments. These fragments are carried away by wind, ground by glacier meltwaters, tossed in the ocean, deposited by river floods, and moved by landslides. These fragments are also chemically weathered, and some of the minerals within them are dissolved. Decaying plants and other organic matter mix with the fragments. Climate, new vegetation, water draining across the land, and changes in land use all contribute to the continuing transformation of the soils. These interactions may have taken place just yesterday — a river flooding or a new development requiring fill dirt that is trucked in from another site and mixed with the native soil — or they may have taken place millions of years ago.

KNOWING YOUR SOIL

SOIL TYPES

Soils are categorized by type in soil surveys, which are documents that have been completed for about 90 percent of Virginia by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service. One hundred and ninety different soil types have been identified within the Potomac River watershed. Soil types are determined by the rock from which they originated and how they were changed by weather over time. Soil surveys were originally designed to serve agriculture, but since 1960 they have been expanded to serve suburban and environmental interests. Soil maps show the geographic location of different soil types on the landscape. Soil types are frequently given names indicating the location where the soil was first discovered. For example, soil type number 47 in Prince William County is known as Quantico Sandy Loam. Soil maps are useful for planning purposes and as an initial guide but may not be specific or accurate enough to help you with questions about your backyard vegetable garden.

SOIL CHARACTERISTICS

The ideal soil for a garden is deep, crumbly, and well-drained. It is rich in nutrients and organic matter and active with microorganisms. It usually has a pH between 5.5 and 7.5 (for nonacid loving plants). A compacted soil may prevent roots from spreading and prevent water from soaking easily into the ground. Not only does this short change your plants, the extra runoff may lead to erosion and stream degradation. A sandy soil, low in organic matter, often holds very little water. In such a soil, the benefits of rains are often short-lived, and garden chemicals can more easily leach from the root zone into the groundwater.

Soil Texture and Structure Soil may be loose and crumbly or hard and massive. The texture of a soil is determined from the proportion of its particles of sand, clay, and silt. Sand grains are large enough to be seen and felt individually, silt particles are medium-sized like flour or chalk dust, and clay particles are microscopically fine. An easy field test to determine the clay content of your soil is to

squeeze a handful of soil in your fist. If it crumbles easily, the sand content is high. If it squeezes easily into a "snake," the clay content is high.

Soil pH Level Soil pH is an indication of relative acidity or alkalinity. It is reported on a scale of 0 to 14, with low pH numbers being acid and high pH numbers alkaline. A pH of 7 is neutral. Most plants do well in Virginia in a neutral to slightly acid soil.

Soil Drainage Do you have puddles in your yard? Or does water rapidly disappear into the ground? Does water travel across the surface of your yard? Drainage describes how well your soil handles and moves rainfall, surface, and subsurface water. Well-drained soils will not pond and will not remain soggy for long periods of time. These soils are generally the most suitable for building sites and allow the most versatility in plant selection. Poorly drained soils have groundwater tables within a few inches of the ground surface or even at the ground surface during wet periods of the year.

Soil Permeability Permeability refers to the ability of your soil to transmit water or air. The permeability of your soil will affect your choice of a drainage system, sewage disposal system, plants, and building construction techniques. Soils that are high in clay or have little space between particles for the movement of water or air usually have low to very low permeability. Poorly drained soils hold water and present challenges for landscaping, yard drainage, and maintenance of a dry basement.

Soil Profile

Your soil may also have a layer of material that restricts the downward movement of water during wet periods and results in a temporarily perched groundwater table. This layer may also stop the roots of your plants. During dry spells, your plants may require additional water. Test the permeability of your soil by pouring water on it. Give it a few minutes, and then dig. How deep did the water penetrate? Remember this when you water your garden or lawn. Time your watering, and gauge the amount of water needed to reach your plant's roots based on your research (see page 23).

Soil Depth Most native or natural soils are made up of varying layers, called horizons, that have developed over the rock from which they were formed. Beginning as a thin layer of material on rock, they are continually transformed by climate, drainage, and vegetation. A soil profile is a vertical slice of earth that depicts the structure of the soil from the earth's surface down to bedrock. The upper several feet of soil are the most important to the homeowner.

Soil Erodibility Soils are categorized as to how likely they are to wash or blow away. The most erosive soils are ones that are silty or sandy. Soils on moderately to steeply sloping areas are more likely to erode than soils on gentle slopes. Vegetation should be established as soon as possible on any bare soil area.

IMPROVING YOUR SOIL

You may find that your soil is unlike any described for your area. This could be because the native soil was greatly altered during the construction of your house through grading, compaction, removal, or burial. Improving your soil structure is one of the most important aspects of soil care, and adding organic matter is the most effective way to accomplish this.

WHY TEST YOUR SOIL?

A soil test will give you an inventory of the minerals in your soil affecting plant growth. A rating of low, medium, or high is given for

magnesium, calcium, phosphorus, and potassium. No test is made for nitrogen, a relatively unstable and short-lived nutrient. Nitrogen must, in most cases, be applied annually and tailored for the particular plant to be grown.

Soil pH is also reported on the soil test results. In Virginia, chances are that your soil will need an application of lime. Be careful to follow the directions and to apply the recommended lime in accordance with the application rate and at the right time of year. The same holds true if fertilizer is recommended. Lime and fertilizer washed off the land by heavy rains don't help your plants, and they contribute to stream pollution.

How Frequently? Test your soil every three years. Always fill out the soil test information sheet as completely as possible. Lab recommendations are partly based on information you provide, such as soil texture (sandy, loamy, or clayey), last lime application, and what you intend to grow in that area.

Where Do You Get a Soil Test Kit? Call your local Soil and Water Conservation District or your Virginia Cooperative Extension agent. Mail soil samples to Virginia Tech or a private lab for analysis. There is a small fee.

HOW CAN YOU IMPROVE YOUR SOIL?

First, make an honest assessment of your conditions. Decide what deficiencies are worth the effort to change and what makes more sense to leave as is. For example, if your soil is sandy, clayey, or has been compacted, till in organic matter and mulch liberally for several years. Plant cover crops (see page 22) each year until your soil is improved. If a proposed planting site has a high seasonal groundwater table, it may be feasible to drain the area with swales or subsurface drains. However, if your ground is very rocky, perhaps a rock garden is the most appropriate solution.

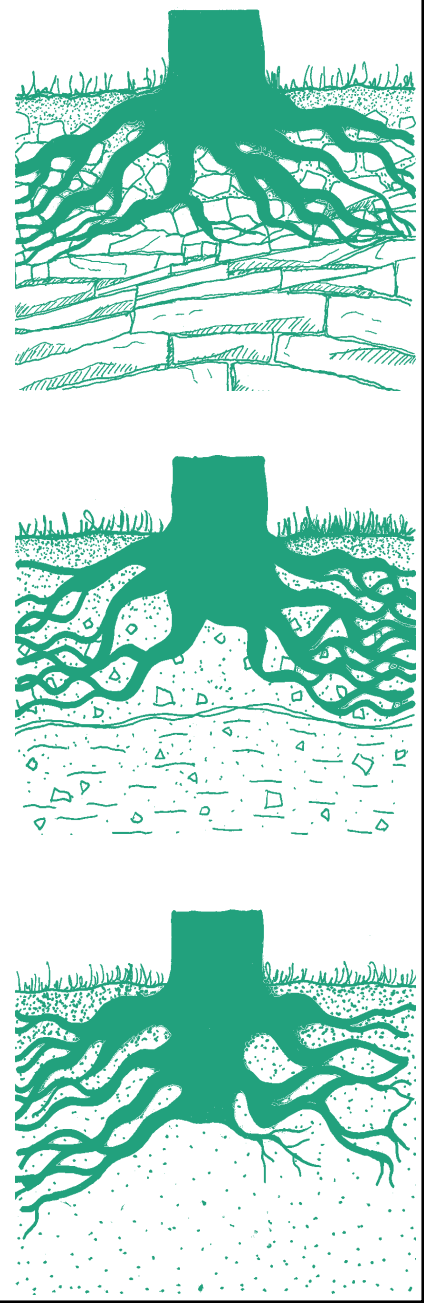
Adding Organic or Composted Matter

Many local soils are naturally low in organic matter. Their productivity as well as their workability can be greatly enhanced by mixing additional compost into the top 4 to 6 inches of soil. Organic matter acts as a sponge, soaking up excess moisture and gradually releasing it as plants need it. It also enhances the soil's structure and helps to maintain the appropriate pH balance. Peat moss, composted leaves, crop residues, or straw should be tilled into garden soil in the fall and winter. At the same time, grass clippings, manure, or fertilizer should be incorporated to provide the extra nitrogen required to help break down the dry organic materials. This material can be composted and added to the garden in the spring if you prefer. This is particularly true if you are adding manure, as it may "burn" plants if it is too fresh.

Adding Nutrients If your soil test recommends additional nutrients, add them at the appropriate time for the plant and according to the directions. Excess nutrients can run off and pollute nearby streams.

Tilling Your Land Use a rototiller if your area is too large or the soil is too hard to hand

Soil Drainage

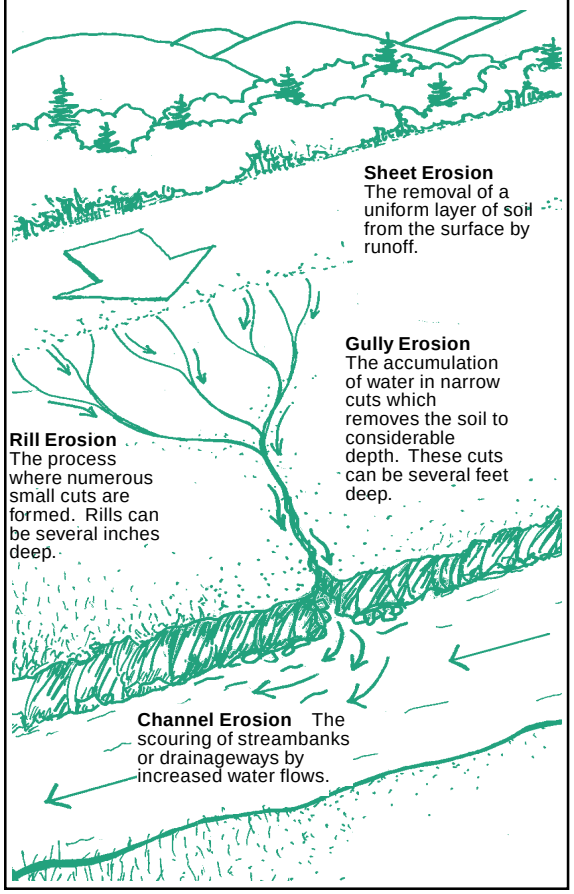


dig. Never till your soil when it is wet. This may destroy the soil's structure. For established lawns tilling is very beneficial, particularly for hard or dense subsoil conditions. Aeration encourages greater root depth and improved water intake.

FOR MORE INFORMATION

- Local Soil and Water Conservation District
- Virginia Cooperative Extension
- USDA Natural Resources Conservation Service

Types of Erosion



SOIL EROSION

WHAT IS SOIL EROSION?

Soil erosion occurs when soil particles are carried off by water or wind. In addition to the soil, runoff can wash fertilizer and other pollutants along with it. Most phosphates and pesticides entering Virginia's waters are attached to these soil particles. Nitrogen and phosphorus from fertilizers carried by runoff have been associated with many environmental problems. Streams, ponds, rivers, and the Chesapeake Bay suffer from algae growth, depletion of the water's oxygen supply, and suffocation of aquatic organisms.

WHAT ARE THE SIGNS OF SOIL EROSION?

Everyone recognizes a gully as evidence of soil erosion. Muddy water in your gutter or driveway also indicates that erosion has been occurring. It may only be visible for a time following a rain, but the damage will continue unless something is done.

The following are other indications of erosion.

- Bare spots on your lawn or property
- Exposed tree roots
- Small rills or gullies on slopes
- Soil splashes on your windows and outside walls
- Sediment that collects in low areas or on pavement

HOW CAN YOU STOP SOIL FROM ERODING?

To solve the erosion problem, you must identify the cause and then correct it with some type of conservation practice. If you have a problem with excessive stormwater runoff from an adjacent property, the solution may involve that property. A long-term solution often involves analyzing the entire watershed.

Fixing Bare Spots on Your Lawn or Property Excess water is the most frequent cause of bare spots and erosion. If the excess water is moving across your property, redirect it to a more appropriate spot with a diversion made of logs or earth berms. The redirected water can then be diverted to an appropriately planted grassy area, a dry well (an underground reservoir filled with stone and lined with filter fabric that detains the water until it seeps into the soil), or an underground drain pipe. For all but the smallest diversions, you should contact a specialist for advice. If your bare spot is caused by standing water, you will need to regrade the surrounding ground to encourage the water to move where you want it to go.

Plant or mulch the area once you've redirected the water or regraded the ground. If little soil is there, till topsoil into the bare spot before planting. Be careful not to create a new dam by raising the height of the ground surface! If the area is steep or small, sod or other plants may be more appropriate than grass seed. Any kind of cover (grass, straw, or mulch) can reduce erosion. In shade or heavily trafficked areas, a permanent path of stone, woodchips, or gravel may be your best answer. If you make use of pavement, consider using a porous pavement or concrete, brick, or stone placed in sand that allows some of the water to drain through the open spaces into the ground.

Avoiding Soil Splashes on Windows and Outside Walls Runoff from the roof may be overflowing from the gutters, splashing soil onto your windows and walls. A concrete splashblock at the downspout outlet or an underground pipe may control this type of erosion. The outfall of the pipe may present a similar erosion problem. Direct the gutter runoff toward a grassed or other planted area, stream, street gutter, or dry well. Runoff from the roof may also be directed into a barrel with a gutter spout and stored for later use.

Ridding Your Land of Dirt Puddles
Whether your home is new or old, you are likely to have muddy puddles. Children love puddles, but they are a sign that you have an erosion problem. You will need to reshape the ground surface by grading to redirect the water runoff. Fill the depressions with additional topsoil, and replant.

Removing Small Rills or Gullies on Slopes Groundcover is the most common solution to eroding slopes that are too steep for grass. An eroded slope needs to be smoothed and then planted with groundcover seedlings spaced 12 to 18 inches apart. It will take at least two years to establish, so use mulch or temporary seeding in the meantime to help prevent erosion. If runoff from sloping land causes damage on your property, you can divert the water away from the trouble spot (see page 13). Construct a diversion of earth, brick, stone, or treated wood that directs the flow of water.

Terracing is another way to address erosion problems found on slopes. The steeper the slope, the greater the potential for an erosion problem and the more difficult it may be to solve. Slopes may be regraded into a series of terraces. The terraces can be held with retaining walls or planted with grass or groundcovers. If you plan to mow grass on the terrace slopes, be sure to make each slope three times wider than it is tall. The terrace itself must be graded with a slight slope to ensure that you don't create a puddle or that it doesn't erode. Wide bench terraces with sloping banks protected by vegetation or retaining walls are often the most practical treatment for steep slopes around buildings. Good topsoil should be removed and stockpiled before excavating or grading so it can be replaced as the final surface. You may need professional design help to create retaining walls that have adequate foundations and drainage.

FOR MORE INFORMATION

- Check with your local government to determine if permits for wall construction are needed or if there is a drainage easement on a portion of your property. These are shown on your plat.

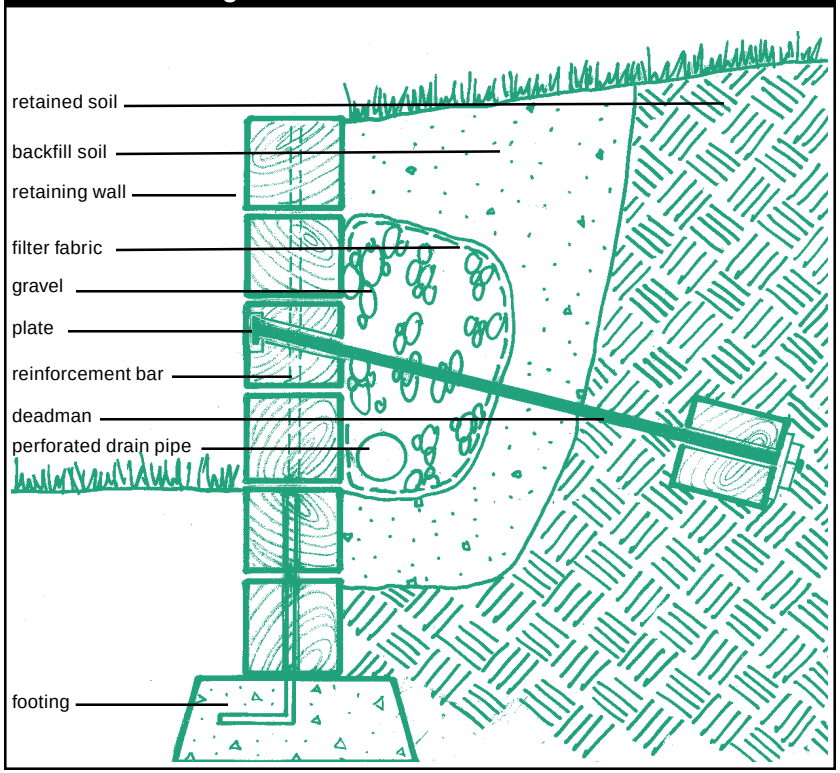
DRAINAGE

WHY DOES DRAINAGE MATTER?

Water always takes the easiest path. Because of this, it is important to understand how and what drainage is in order to find an alternative path for the water on your land. Of course water flows downhill. What is confusing is that when water flows downhill, it may end up in a stream several hills away from your land. How does it get there if it is always taking the easiest path? An understanding of what makes up a watershed may help to explain the answer.

Airplane travelers have the best opportunity to see watersheds. From the air you'll see lakes

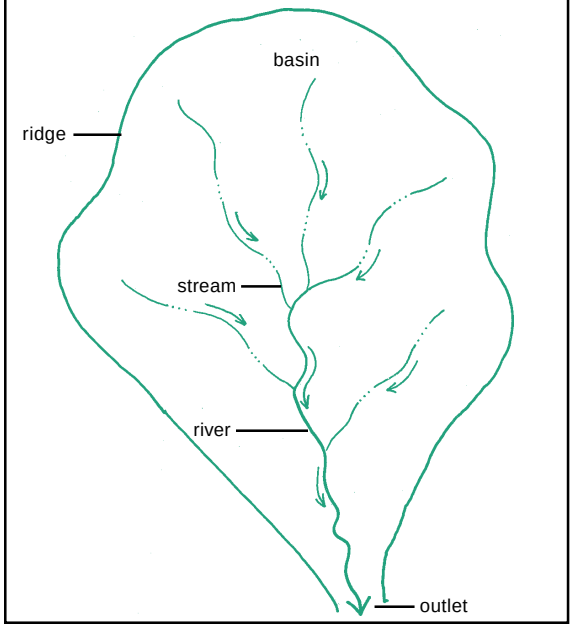
Timber Retaining Wall



and rivers fed by many small streams. The area that drains to a common stream, lake, or river is called the watershed. Each of the small tributary streams has its own tributaries; thus each has its own small watershed. Watersheds can be very large, like the 64,000 square mile drainage basin of the Chesapeake Bay. They can also be very small. Try to find the boundaries of your neighborhood stream's watershed. Identify the ridgeline or other barrier that divides the water that runs to your stream from water that runs to another stream.

Rainwater reaches a watershed's stream in two ways, either by running off the surface or soaking into the ground where it flows beneath the surface of the earth to a stream. Like surface water, groundwater also tends to flow downhill, through the soil and fractures in the bedrock. Emerging through springs, groundwater feeds the creeks between rainstorms.

Watershed



DRAINAGE ON YOUR PROPERTY

What drains from your property will affect much more than your land alone. Water supplies are threatened by overuse and contamination. Pollutants in water are frequently referred to as point and nonpoint source pollution. Point source pollutants come from an identified point such as an outfall pipe at an industrial operation. Nonpoint source pollutants come from many sources such as pet waste, leaking or improperly disposed auto fluids, car wash detergents, or fertilizers from your lawn. Pollutants are carried down into the groundwater table with percolating water draining through soil. Pollutants are also washed into lakes and streams via surface runoff. Storm drains, along streets and in backyards, lead to local streams. Home lawns and landscapes contribute to pollution when improper water management and chemical application allow fertilizer or pesticide-laden runoff to drain into our water supplies.

Groundwater Table and Percolation In some areas, soils are very slow-draining and are referred to as having a high groundwater table. Groundwater tables tend to be at their highest in February and March in Virginia as a result of snowmelt and rains. In areas with a high groundwater table, avoid digging a basement or take special measures to keep basements dry. These may include reinforced concrete foundation walls with special attention paid to waterproofing, foundation drains, and sump pumps. You may also want to lower the subsurface groundwater level with an underground drainage system.

Runoff Before your house was built, rain fell evenly over the ground where it stands. Most likely, grass and shrubs or a canopy of trees kept the soil open and porous. Even in a hard rain, two-thirds or more of the water soaked into the ground as it fell. Now the rain pours off roofs, parking lots, sidewalks, and driveways (all of which are impervious surfaces) and is often channeled to underground stormwater sewers that pipe the water away from your property. The ground around your house is often compacted as a consequence of building construction. This compaction may reduce the amount of infiltration and increase the runoff 2 to 10 times as much as the same land in forests or farms. Runoff from your yard is the water that runs across your yard and all the material the water picks up and carries with it.

Grading The fill around your house should be properly compacted and graded to slope away from your house at least 5 percent for a minimum of 10 feet, making the ground 6 inches lower than the ground surface at the house wall. This will drain surface water away from the wall and help prevent water from standing against the wall and potentially seeping through it or causing water pressure under the basement floor. Planting and mulching around outside walls should be done carefully to preserve drainage away from the wall.

To help prevent surface water from standing in your yard, don't create or maintain a perfectly flat space. Maintain a slight slope that drains toward a swale, rain garden (see page 40), or storm sewer inlet. If you can't do this, some type of underground pipe and gravel drain with a sump may be necessary. Even very well-drained soils may become saturated in a Virginia summer thunderstorm, so try to maintain a slope of 5 percent away from the house and 2 percent everywhere else.

Wet Lawns If your yard, or some portion of it, remains wet and soggy for extended periods (two or three days following a rain), the natural drainageways may be blocked or have settled and do not have enough grade to drain. Soggy ground and wet lawns are often the result of trapped surface water with no place to go. Most yards are originally graded so that water flows from the front to the street and from the back to a swale, ditch, or storm sewer. A swale is also normally provided between houses along the property line to the front or rear or both. You may have inadvertently changed the existing grade of your land with a patio, walk, or mounded planting beds, or trees may have grown significantly and their roots raised the ground surface. If your yard is so flat that you cannot get good flow or if you have a high groundwater table, then some kind of subsurface drain may be needed. A 2-foot-deep trench with a perforated pipe surrounded with gravel to collect this standing water and lead it to a suitable outlet may be effective.

Wet Basements Water can enter your basement in one of three ways.

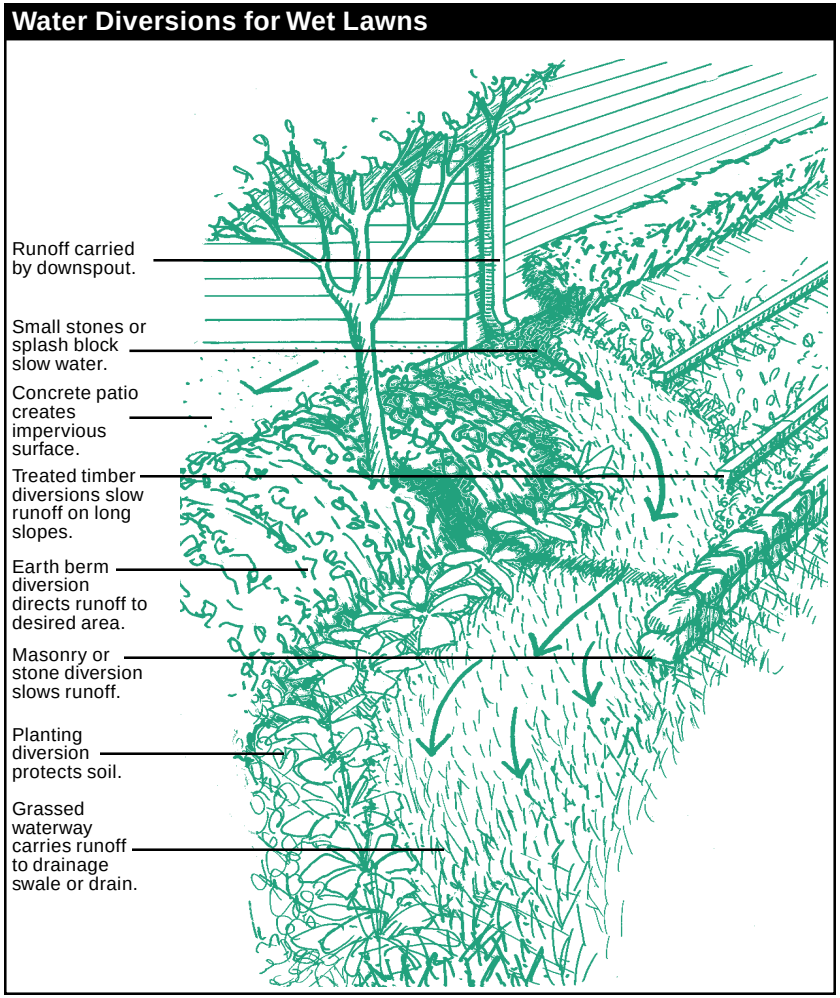
- Through cracks in the basement wall
- Through the joint between the basement wall and the basement floor
- Through the basement window well

Check the exterior grading to ensure that surface water flows away from your house. With the passage of time, soil often settles around the foundation wall. Water ponds in these settled areas, and what doesn't evaporate may find its way into your basement. Flower beds and other plantings may hold water against the wall. When regrading, avoid placing soil next to wood or siding. Examine the window wells, and ensure that all contacts between the outer foundation wall and the window well casing are well sealed. A window well cover may be a useful addition. Also check for clogged gutters and downspouts. Directing rain water away from your house and extending roof drainage outlets to 6 or more feet beyond your foundation often can prevent or correct a wet basement problem.

If water is entering through the wall, the parging (exterior mortar coat) or waterproof seal is cracked, too thin, or missing. You should consult with a contractor. If the wall is merely damp on the inside or seeps are visible, you may be able to cure the leakage by coating the interior wall with a waterproof cement-sand mixture.

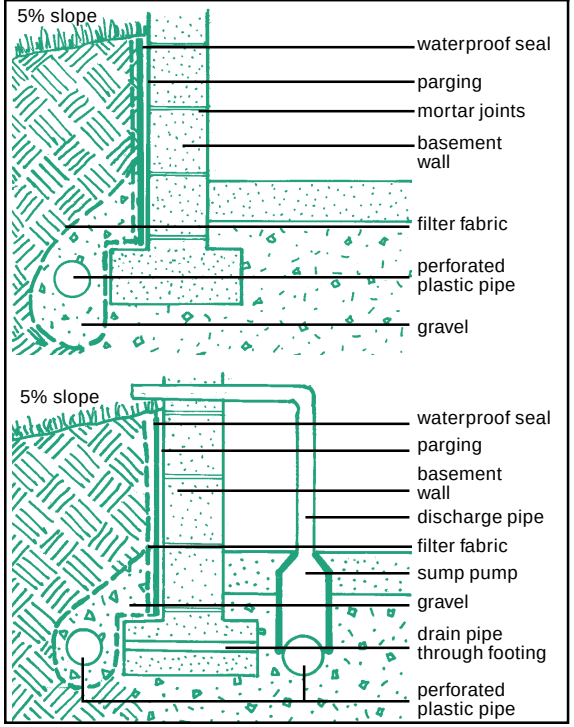
If water is entering through the joint between the wall and the basement floor slab or through cracks in the floor, water pressure exists beneath the floor. First correct the surface

Water Diversions for Wet Lawns



drainage to force surface water away from the wall, and then check for the presence or absence of footing drains. If you don't have construction drawings of the wall footings, try to get them from the builder or your local jurisdiction's Building Inspector files. Check for the presence or absence of an exterior drain by looking for a plastic pipe discharging at a point in your yard below the level of the footing or, if a storm sewer inlet or manhole is nearby, looking inside it to see if there is a plastic pipe through its wall from the direction of your house. If the drain is there, but there is no flow and your basement continues to leak, the pipe may have become plugged with earth or tree roots over time. Correcting this can be a major job. It may require snaking-type equipment to reopen plugged drains along all or part of the length of the footing. Occasionally, a deep penetration of frost followed by some thaw and a heavy rain will temporarily restrict the flow from the surface to the drain.

Basement and Footing Drains

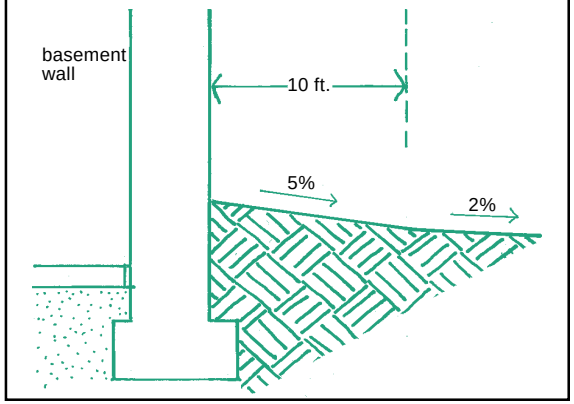


The presence of an interior under-floor drain is generally confirmed by the presence of a sump. If the sump is full of water and there is no sump pump, have one installed by a licensed plumber. If there is a sump and working pump but water still comes up through the floor joint or cracks, the perforated drain under the floor may have become plugged, or the pipe may have been laid incorrectly so that it does not drain by gravity toward the sump. The latter case is most likely where heating ducts are embedded in or under the basement floor. Correction of either problem may entail breaking up the floor slab to get at and clear or reinstall the drain pipe. Most building codes require that, wherever possible, the discharge line from a sump pump be connected to a storm sewer. If no storm sewer is located nearby, the discharge pipe must empty into a drainage swale, ditch, or stream that will carry the discharge away from your house without causing problems for a neighbor. If a sump pump is set up to discharge at the exterior of the foundation wall, extend the discharge pipe so that water runs away from the house.

Gutters and Downspouts Among other purposes, the gutters around the edge of the roof are intended to collect the water before it drips down the side of the house and puddles in the soil near the foundation. The gutters should be firmly and tightly attached against the face board (fascia) at the eave ends. If they are not, water may seep between the gutter and the face board, rotting the face board and soaking the walls. Gutters are sloped to downspouts generally at about 0.5 percent. (For a 30-foot-long house, the low end of the gutter should be about 0.15 feet or 1.8 inches lower than the high end of the gutter.) Check your gutters during the fall and winter to be sure they are not clogged by leaves, snow, or ice.

Downspouts take the concentrated flow of water from the roof gutters and discharge it onto the ground. At a minimum, the downspout should discharge onto a splash block to prevent the concentrated flow from gouging a gully or collecting along a foundation. The splash block absorbs some of the energy of the falling water and spreads it out so that it is less likely to erode the yard. Soil may be washing away at the end of the splash block. One solution is to attach flexible

Surface Drainage

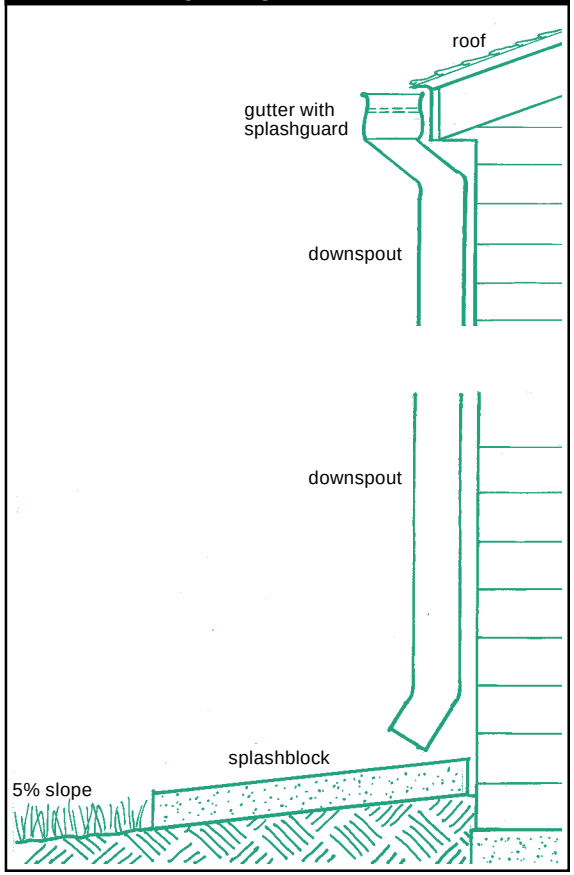


perforated plastic tubing to the end of the downspout. This tubing is designed to stay rolled up during dry weather. During a rain, flow from the downspout will automatically force the tubing to unroll, and water will be distributed through the holes in the extended tubing. Rigid pipe also can be used, but it needs to be moved frequently to avoid killing the grass.

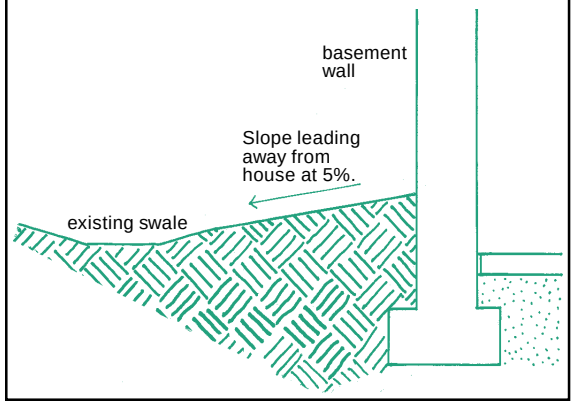
Draining Swimming Pools Improperly draining a swimming pool can contaminate nearby streams and ponds. The chlorine, acid, and other chemicals associated with pool maintenance can be hazardous to aquatic life. Before draining your pool, check with your local health department for any regulations. Start by letting the water in your pool sit for several days to let the chemicals evaporate. Don't add more! After several days, test your water, and if it still contains noticeable levels of chlorine, pool acid, or other hazardous chemicals, drain the pool water into the sanitary sewage system. Regardless of the test results, never drain pool water directly into a stormwater system or stream. If chemicals are at safe levels for groundwater discharge, then drain the pool onto a grassed area of your property. Make sure that the pool water does not create a drainage problem for yourself or your neighbors.

Flooding and Storm Drainage Easements A normal storm drainage system is sized to handle a "10-year storm" event (10 percent chance of occurrence in any one year). Major drainageways are designed to handle a "100-year storm." Occasionally high-intensity storms will exceed the "10-year storm" event (5 to 5 1/2 inches in 24 hours), causing pipes and channels to overflow, but unless the "100-year storm" is exceeded (about 7 1/2 to 8 inches of rain in 24 hours), house flooding should not occur. Drainage easements may be recorded on your property if a storm sewer pipe, paved ditch, or drainage swale runs through your lot. These easements are for surface drainage as well as underground storm sewer systems. (Underground pipes and surface systems are generally designed to carry

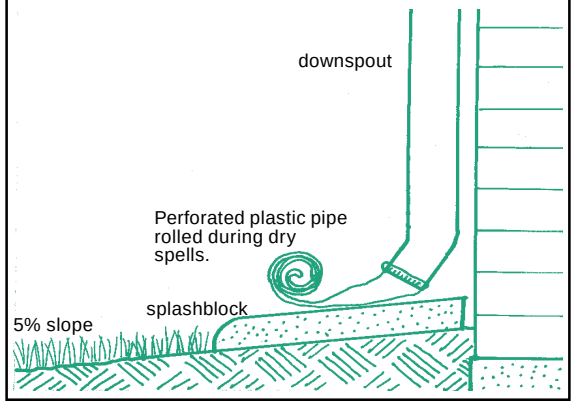
Gutter with Splashguards



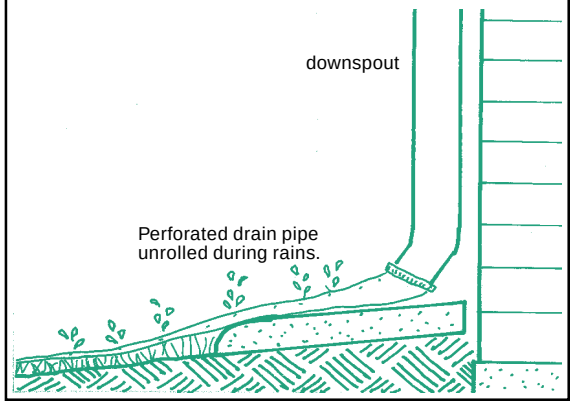
Surface Drainage and Swale



Gutter with Perforated Pipe Rolled



Gutter with Perforated Pipe Open



a “10-year storm” event.) When storms greater than this occur, the overflow stormwater is carried on the surface. The surface swales are designed to carry additional flow during large storms and help prevent dwelling flooding. The easements are recorded to give you notice that this is where stormwater runoff is intended to flow and that you should not construct anything in the easement to interfere with that flow. The easement gives right of access for inspection and repair of the storm sewer system. Any construction or grading within these easements that will interfere with maintenance of underground systems or interfere with surface drainage is not allowed. Fences can generally be installed in easements, provided they do not interfere with the intended use of the easement.

Many house lots are partially in the 100-year flood plain. This is the area that would normally be flooded by a major storm having a 1 percent probability of occurring in any one year. Expect such an area to occasionally flood. These lands are good for gardening and other uses that do not interfere with the intended purpose of the flood plain. You must receive approval for construction activities occurring in the 100-year flood plain. You may be asked to sign a “Hold Harmless” agreement, agreeing that this will be done at your risk.

Underground Drainage Systems If surface diversion and regrading methods don’t solve your drainage problem, you may want to construct an underground drainage system. The most common type is an underground drain pipe — perforated pipe in the bottom of a gravel-filled trench. The pipe must drain downhill to a waterway, storm sewer, or other outlet. The trench is lined with a filter fabric to prevent the soil particles from plugging up the gravel filter and pipe.

You can also drain surface water from your backyard with a catch basin placed at a low spot. It is connected to a subsurface pipe that carries the runoff to a waterway or a storm sewer. Dry wells may work if the soil is very permeable and can absorb a large amount of water quickly. If correctly built, dry wells will bypass impermeable soil layers to better drained soil layers below.

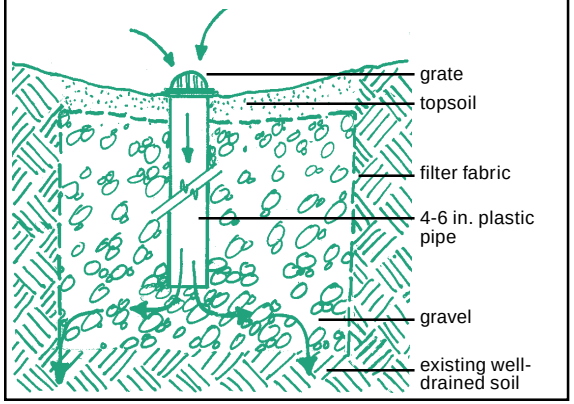
FOR MORE INFORMATION

- Local government for regulations and permits
- Local Soil and Water Conservation District
- USDA Natural Resources Conservation Service

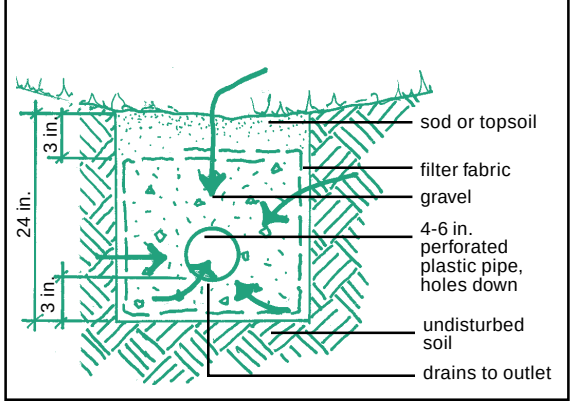
MANAGING SEPTIC DRAINFIELDS

Houses constructed in areas without a connection to a sanitary sewer system will have an individual subsurface sewage disposal system. Recent advances in wastewater treatment technology and changes to Virginia’s standards have offered a number of new sewage disposal systems types, including low pressure dosing, drip irrigation, spray irrigation, elevated sand mounds, alternative discharging sewage treatment systems, and others. However, by far the most common type

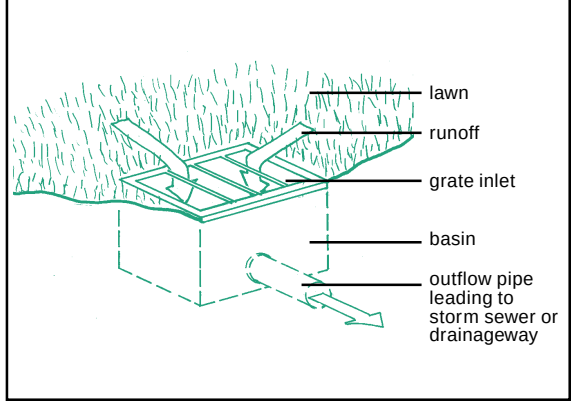
Surface Water Dry Well



Underground Drain Pipe



Surface Water Catch Basin



of private sewage treatment and disposal system is the conventional septic tank and drainfield system.

The purpose of a septic sewage disposal system is to carry waste away from the house. A septic system allows the solids to settle within a tank and the wastewater to drain to a drainfield and be absorbed by the subsurface soils. Proper treatment and disposal of sewage from a septic tank and drainfield system requires that the soil be suitable to treat and dispose of large quantities of wastewater before it reaches the groundwater. Soils must undergo a very careful physical evaluation and/or testing prior to health department approval in Virginia. One commonly used test is referred to as the "perc" test — a test of the soil's ability to percolate, or pass, water through it. The proposed system's location is equally important to avoid contamination of wells, drainageways, ponds, or streams. Contact your local health department for more detailed information on your system and the soils that your system relies on for proper treatment and disposal of sewage.

Over time, the septic drainfield absorbs hundreds of thousands of gallons of sewage effluent and will last many years if properly maintained. A malfunction of a septic system may be expensive and offensive, potentially resulting in a backup of sewage in the toilets and drains of your house, sewage effluent ponding on the surface of your drainfield, or both. Health risks to humans caused by direct exposure to improperly treated sewage are numerous. It is important to take care of your sewage disposal system to prevent serious diseases, save on the astronomical costs associated with improper maintenance, and prevent further contamination of surface water and groundwater.

Drainfield systems constructed in the past decade generally have a designated repair area. The intended repair area should be reserved for this purpose only. No alterations should be made that would alter the soil's suitability to be used for sewage disposal.

SPECIAL MAINTENANCE PRECAUTIONS

Plantings A good vegetative cover should be maintained over the system. It is important to protect the surface from any erosion since the drainfield lines are often within 2 feet of the ground surface. Herbaceous, shallow-rooted plants such as flowering perennials and annuals, turfgrass, and many groundcovers are unlikely to damage the lines. Roots from nearby trees or shrubs may clog and damage your drain lines. Do not double dig or be too enthusiastic in tilling the soil, given that the lines are within 2 feet of the ground surface.

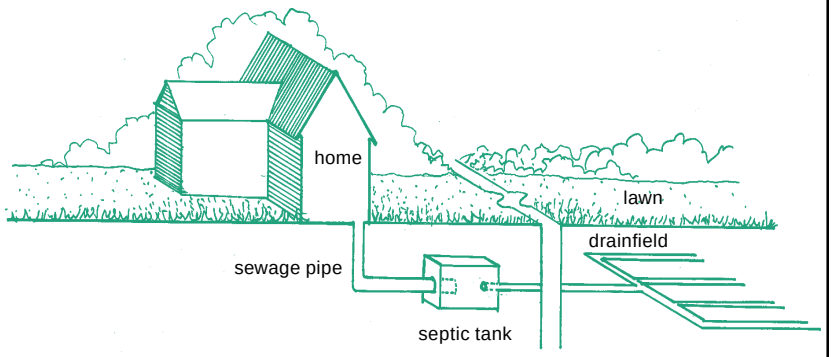
Practice Water Conservation

Household water use directly controls how quickly waste travels through the system. Too much water moving too fast through the septic system does not give the helpful bacteria time to break down the solids. This is why it is important to repair dripping faucets and leaking toilets, run washing machines and dishwashers only when full, avoid long showers, and install water saving features in faucets, showerheads, and toilets.

Control What Goes Down the Drain

Controlling what goes into the water that enters the septic system is just as important as reducing the quantity of water that flows into the system. A septic system is dependent on a balance of "good" bacteria and solids to work properly. Because kitchen disposals don't "digest" what food they grind up, they are not recommended if your house is on a septic system. Avoid using excessive amounts of chlorine bleach and other chemicals. They will not only take care of the job at hand but will wipe out the helpful bacteria in your system which are vital for breaking down waste. Non-degradables such as grease, disposable diapers, and plastics, and chemicals such as gasoline,

Typical Septic System



oil, paint, paint thinner, pesticides, and antifreeze should be kept out of your septic system.

Surface Drainage All new drainfield sites are selected because of their good natural internal soil drainage and good surface drainage. All yard and downspout drainage, as well as your sump pump, should be diverted away from or around the drainfield. Correct any depressions in the drainfield where surface water might collect.

Traffic over the System Do not allow any heavy vehicles or equipment to drive over the drainfield, especially during wet weather. The weight of the equipment may compact the soil and damage the network of drain pipes. No paved areas should be constructed over septic drainfields. Small-riding lawn mowers are okay to use on the drainfield.

Cleaning Households within the Chesapeake Bay Preservation Act geographic area are required to have their septic systems pumped every five years by a licensed pumper and hauler. Pumping your septic tank every three to five years greatly reduces the need for costly repairs and may enhance the life of the sewage disposal system. Frequent pumping will reduce the accumulation of solids and grease in the drainfield, a common cause for failure.

FOR MORE INFORMATION

Contact your local health department for recommendations on maintenance, cleaning, and alterations. Many counties now have mandatory pump-out requirements.

Alternatives to traditional septic systems such as constructed wetlands are being explored in parts of Virginia. For more information, contact your local health department, the USDA Natural Resources Conservation Service or the National Small Flows Clearinghouse.

TESTING YOUR WELL WATER

If your home is on a private well system, you are solely responsible for monitoring the quality of the water. For the health of your family and the value of your property, pay attention to your water quality. Water that appears clean and clear may include potentially harmful materials. Different well types and their age require different levels of monitoring.

The following are some signs of problems with well water.

- Members of your household have reoccurring gastrointestinal problems. Test your water for coliform bacteria, nitrate, and sulfate.
- Your household plumbing contains lead pipes, fittings, or solder joints. Test for pH, lead, copper, cadmium, zinc, and corrosion.
- Water has an objectionable taste or smell. Test for sulfur or iron.

Test your well annually for the following.

- Total coliform bacteria (found naturally in digestive tract of all birds and mammals; presence of unsanitary conditions and the possibility of pathogenic microorganisms)
- Nitrates (found naturally in food, plants, water, and soil but greatly enhanced by fertilizers and septic system effluent; high levels are particularly harmful to expectant mothers and newborn infants)
- pH (a measure of how acidic or alkaline a substance is; extremes may corrode household plumbing)
- Total dissolved solids (concentration of dissolved materials in your water is referred to as total dissolved solids)
- Pesticides
- Lead

In addition, test for contaminants that you are likely to encounter. Based on the surrounding land uses, test for fertilizer and pesticide contamination. It is important to keep records of tests and results; this will enable you to identify changes in water quality due to contamination or deterioration of the system. Routine testing is the only way to assure that your water supply is safe. It is recommended that you test your well annually.

FOR MORE INFORMATION

- Local Health Department
- Local Soil and Water Conservation District
- Virginia Cooperative Extension