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homebuyers:

soil surveys
can help you



United States Department of Agriculture
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Homebuyers . . . Soil surveys can help you

Are you planning to build or buy a house? If so, you're about to make the biggest purchase most people ever make.

You've probably spent a long time thinking about your new home's design and location. But did you know that a soil survey and careful onsite investigation can help you decide where to build or buy—and can warn you of possible soil-related hazards?

Published soil surveys are available from the Soil Conservation Service of the U.S. Department of Agriculture.

Can your soil do the job?

The foundation supports the walls, the walls support the roof—and the soil holds them all. But how can you tell if the soil will be a good “home” for your house? You need to answer some important questions:

- Is the soil stable, or does it have properties that can cause the foundation or walls to crack?
- Is the soil in an area subject to flooding?
- Will storm runoff drain safely away from the house and lot? Or will it turn your yard—or basement—into a pond?
- Does the soil have a seasonal high water table that can cause a basement to flood or a septic system to fail?
- Is the soil deep enough for a basement to be dug economically? For garden and landscape plants to take root and thrive?
- Is the soil so steep that erosion may be severe?

A soil survey can help you answer these and many other questions about the soil. It can also help you decide whether you should hire a professional to investigate a site for problems.

What is a soil survey?

A soil survey contains maps and a description of each major soil in the survey area—generally a county. More important, the survey tells how soil properties affect a wide range of rural and urban land uses.

Soil surveys are made by the Soil Conservation Service (SCS) in cooperation with other federal, state, and local agencies. Published soil surveys are available on request from local SCS offices. There's a good chance the survey for your area has been published; if not, SCS personnel can provide soil information and may have soil maps for your area.

Like any tool, a soil survey is helpful only if you know what it can and can't do—and if you use it accordingly. The survey does not replace careful onsite investigation or analysis by a soil engineer or other professional.



This house had to be torn down. When saturated with water, the steep and unstable soil began to slip downhill, causing walls, foundation, and pavement to crack. The soil survey described the hazardous soil conditions. Before you build or buy, find out about potential soil hazards at the site.

Are all soils more or less alike?

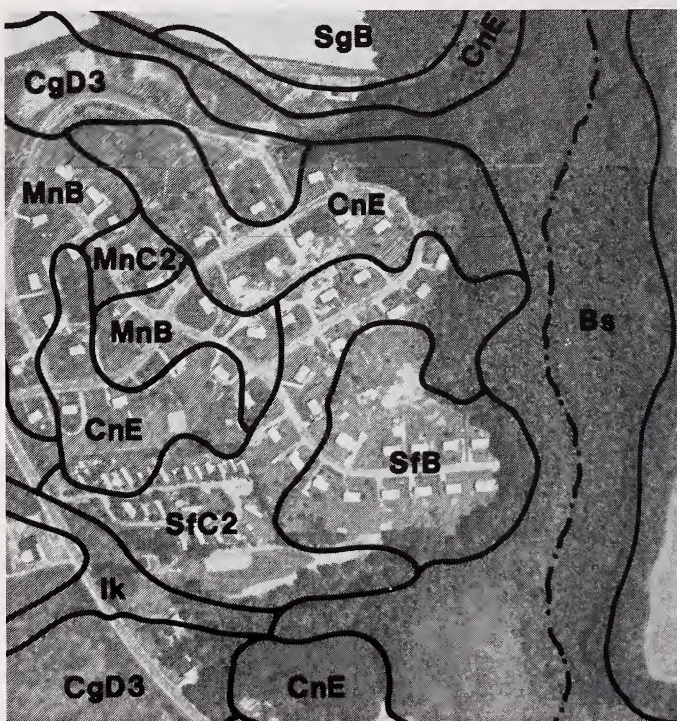
Soil scientists have identified tens of thousands of different kinds of soils in the United States. Most soils consist of three distinct layers: surface layer, subsoil, and parent material or bedrock.

Each soil has unique physical and chemical properties. These properties interact. By studying the interaction, soil scientists and other professionals can predict how a soil will respond to specific land use and management.

More than 25 soil properties are important in determining the suitability of the soil for homesites, septic tank absorption systems, play areas, and lawns and landscaping.

What does the soil map show?

The site you are interested in can be located on the soil map. Soil boundaries on the map are drawn on an aerial photo base.



Part of a detailed soil map from a soil survey published by the Soil Conservation Service.

A soil identified on the map is the dominant one in the land area within the boundaries, but small areas of other soils may also be present. Areas of contrasting soils may be only a few feet apart. Furthermore, filling, grading, and excavating at a homesite can change the drainage pattern and can affect—for better or for worse—the suitability of the soil for various uses.

Usually, however, the mapped soil is present on a given site, and you should consider what the survey says about that soil. The survey also describes the most likely kinds of contrasting soils and their positions on the landscape.

By finding your area of interest on a soil survey map and reading what the survey says about the soils, you can learn about the area's suitability for homesites. In the map on page 4, letter-number symbols represent the names of mapped soils. For example, **SfB** is *Sassafras loam, 2 to 5 percent slopes*.

SfB has only slight limitations for construction of houses, including those with basements and septic tank absorption fields. **MnB** also has only slight limitations for houses with basements, but water moves slowly downward through this soil and, as a result, the performance of absorption fields may be affected.

Bs is on the flood plain of a perennial stream. It has severe limitations for homesites because of wetness and the risk of flooding. **Ik** is rarely flooded, but its seasonal high water table is a severe limitation for homesites and septic tank absorption fields.

The hazard of erosion is a severe limitation for homesites on steep soils such as **CnE**.

Is the soil stable?

Mineral soil consists mainly of sand, silt, and clay particles. In some clayey soils, the foundation may shift or settle unevenly. The results can be a cracked foundation and walls.

Some clayey soils expand as they absorb water and shrink as they dry. This shrinking and swelling can move a house several inches up and down. Unless the foundation is designed to withstand the extra stress, it is likely to crack.

The house may also need a special foundation if the soil at the homesite is organic soil, such as peat or muck. Even if the structure remains intact, the soil may settle away from the foundation.

The soil survey indicates whether the mapped soil is organic or mineral. It estimates the amounts of sand, silt, and clay in each mineral soil. It indicates whether the soil has a potential for shrinking and swelling or has other properties that may cause instability.



When drained and used as homesites, organic soils can subside, endangering the structure.

Is there potential for flooding?

Many people whose homes have been severely damaged by floods were not aware that their homes were built on flood plains along streams. Because flood plains are generally level, they may seem desirable as homesites. Before you buy a house or homesite, however, find out the potential for flooding.

A stream may overflow only once in 5 or 10 years or longer, but the chance of eventual damage to homes on flood plains is high. Even a small stream can become a raging torrent after long or heavy rains.

Soil surveys estimate the hazard and duration of flooding that is likely on each mapped soil. They also show the extent of flood-prone areas.

The chance of flooding can increase at a site as more development occurs upstream. Storm runoff increases as natural vegetation is cleared and the soil is covered by houses, other buildings, parking lots, and roads. When runoff exceeds the stream's carrying capacity, the stream overflows.

In addition to soil surveys, the Soil Conservation Service can provide other information about floods and about measures that can reduce flood damage.



Building on a flood plain is risky.

Will you need a drainage system or other measures to remove excess water?

Some soils absorb water rapidly; in others, water soaks in slowly. Several soil properties determine the rate of water movement through a soil. The soil survey estimates this rate and indicates whether drainage is likely to be a problem.

You should carefully study the drainage pattern on a homesite. When rain falls, where will runoff water flow? One good way to determine the drainage pattern is to visit the site during a storm and watch what happens.

If drainage is a problem, you may need special measures such as subsurface drains. Or the soil may require grading so that water flows away from the house and lot in a manner that does not cause erosion, sedimentation, or flooding downhill. You may need to hire a professional to evaluate the site and design any drainage measures.

Is the soil suitable for a septic tank absorption field?

If a house is located beyond existing sewer lines, a septic tank absorption field may be required. The field may not function, however, if the soil is unsuitable.

If the soil absorbs waste slowly, effluent from the drain field may rise to the ground surface. If the soil is too steep, effluent may surface downhill. If the soil has a seasonal high water table, the field may function in dry weather but not when the soil is saturated. If the soil is shallow to bedrock, a drain field may not be feasible without considerable extra expense.

For each mapped soil, the soil survey indicates permeability, slope, depth to seasonal high water table, frequency of flooding, and other soil properties that affect its suitability for a septic tank absorption field.

Does the soil have a seasonal high water table?

You can't tell whether a soil has a high water table just by walking over the site. The water table may be at a safe depth during most of the year but may rise during the wet season.

When a seasonal high water table rises close to the soil surface, basements can be flooded, septic tank absorption fields can fail, and plants can be damaged or killed.

The soil survey indicates whether a mapped soil has a seasonal high water table and estimates the average depth to it.



A seasonal high water table is one of the soil properties that can cause septic tank absorption fields to fail.

Is erosion a hazard?

Soils vary in their resistance to erosion, but erosion is generally worse in sloping areas. Soil surveys indicate the erodibility of each mapped soil.

Bare, eroded areas detract from a home's appearance, and erosion can have serious consequences. Erosion along the foundation of a house can eventually undermine it. Gullies may form. Mud from eroded areas can build up on your driveway or sidewalk or in other places.

When surface runoff carries eroded soil into a local stream, the sediment can damage water quality, clog reservoirs, and increase the chance of downstream flooding.

The best defense against erosion is to control runoff and to protect the soil with grasses, shrubs, and other adapted plants. The soil survey indicates the suitability of each mapped soil for lawns and landscaping plants.

Erosion can be severe on construction sites where the soil is bulldozed and cleared of vegetation. Some communities require builders to control erosion and sediment before and during construction. You should find out requirements for your area.

Mulch, sediment traps, and a temporary cover of fast-growing grasses help to control erosion on construction sites. SCS personnel can provide information on these and other measures for controlling erosion on homesites.



Erosion control is important even before you move in.

Is the soil deep enough?

If the soil is shallow over hard rock, digging a basement will be difficult. Generally, soil at least 6 feet deep is needed for basements.

Because most plants grow poorly on shallow soils, you may need to buy topsoil or use other aids to establish vegetation.

The soil survey indicates areas where bedrock is generally at depths of less than 5 or 6 feet.

Should your home have a special design?

Many soil hazards can be overcome by special structural design or installation. Homebuyers who are aware of potential hazards can obtain assistance from consultants for special investigations and designs.

For example, soil wetness can be reduced by subsurface drains. Structural problems due to soil shrinking and swelling can be prevented by a foundation designed to withstand the extra stress.

If a homesite of interest to you is in a flood-prone area, it's best to find another site. The damage from flooding on a site can be reduced, however, by professionally designed and installed floodproofing measures, such as grading to raise the site above expected flood levels.

Where is soil information available?

To request a soil survey or other soil information, contact your local Soil Conservation Service office. SCS is listed in municipal telephone directories under "United States Government, Department of Agriculture." There is an SCS office in nearly every county.

You can also request soil information from the Cooperative Extension office in your county and from your conservation district. Conservation districts are local units of state government.

Programs and assistance of the Department of Agriculture are available without regard to race, creed, color, sex, or national origin.

