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Topic:
Silt Sandwich Formations
By Derek Hann, SCD Stormwater Engineer

No one would deny that this past winter and early spring have been exceptionally wet. As Stormwater Engineer for the Snohomish Conservation District, I visited many farm, urban and suburban properties that were suffering from holding too much water, turning their land into unusable seasonal swamps.

Typically, after examining a property, I can advise the owners about installing a drainage system that will safely help collect and drain that extra water. When I am considering on-the-ground solutions to drainage problems like these, the most important factor to understand is the type of soil on the wet property.

Soil Types and Formations

There are many different kinds of soils (sandy, gravelly, silty, and clay to name a few), and they all affect what happens to rain (after it hits the ground) differently. For example, sandy and gravelly soils have large gaps between the individual particles that allow water to travel through it easily.

Silt and clay soils, on the other hand, have very small gaps between particles that act like a barrier, almost totally preventing water from traveling into the ground. Some water does soak in, but at a very slow rate. Most of the properties I visit that have severe flooding problems have soils that are composed of silt or clay that keep water mainly ponded on the surface, instead of allowing it to readily seep into the deeper soils.

How a 'Silt Sandwich' Can Affect Your Property

One particular soil formation I have encountered multiple times this last year presents a unique set of challenges to property owners. I call this soil formation a 'silt sandwich'. Silt sandwich soil formations occur throughout Washington. I have seen them on many occasions on Camano Island and in South Everett. They occur on gentle slopes and are characterized by numerous tiny springs that continually seep water, making the surrounding land squishy and very wet. When one spring is plugged, a new one will pop up nearby.

There is a very simple explanation for these continuous seeps -- it has to do with the soil. The first six to 12 inches of topsoil is a silty/clay mix. If you take a clump and mix it with water to the consistency of Playdough, you can easily roll it into a ball or a 'snake' and the soil keeps this form. The next 18 to 24 inches of soil is sandy gravel. It feels gritty and if you try to make a ball with it, it crumbles instead. Under this sandy gravel is hardpan.

Hardpan is a very dense, deep layer of soil left over from when glaciers advanced and retreated.

It can be as hard as concrete and usually only allows water to seep into it very, very slowly.

Problems arise in these situations when, somewhere upstream, water enters the sandy gravel layer, trickles downward until it hits hardpan, and then flows downhill on top of the hardpan. When this water reaches the 'silt sandwich', it builds up in the middle sandy soil layer within the sandwich of nearly impenetrable silty/clay on top and hardpan below and becomes trapped. The weight of all this trapped water applies constant pressure against the upper silty/clay layer and finds small weak spots where it can push through. Those weak spots become springs, continually leaking water onto the surface.

The best way to determine if this kind of soil formation is causing drainage problems on your land is to dig a small hole near any springs. As you dig you should encounter a few inches of sticky silt, then a layer of sand or gravel, and finally a very hard layer of dirt that is difficult to dig in (hardpan). The silty/clay layer will be moist and squishy. The sand should be wet with visible standing water. If you leave the hole open, it should fill with water and eventually overflow. Water will leak out of this hole and seep continuously. If this scenario is starting to sound hauntingly familiar, here are some "Do's and Don'ts" to help fix this problem.

"Do's"

1. Call Snohomish Conservation District and talk with an engineer or planner. We have a variety of effective practices that can help fix drainage problems.
2. Let us create a plan for you free of charge so you know your remedy was designed by a professional who understands soils and underground water movement.

"Don'ts"

1. Don't dig a lot of holes -- the more you disturb the silt layer, the more it will seep.
2. Don't cover the seeping area with rocks or cobble pathways -- this will only make the silt layer thinner than the surrounding silt and provide a larger weak area for the trapped water to leak out of.

Free Services Available

Snohomish Conservation District can provide free plans and design details for property owners facing stormwater problems. We also provide on-the-ground technical advice during construction.

If you have a difficult drainage issue and are worried about how to resolve it, please call us. Landowners may find they have created additional problems or that their 'fix' is actually illegal. The potential damage to your land, a neighbor's property, or a nearby stream or river can be severe if your drainage system is not properly designed. That's why these plans need to be reviewed and approved by city or county planners and engineers first.

If you don't have a 'silt sandwich' situation, but do have drainage problems or want to know your soil type, contact Derek Hann at 425-335-5634 ext. 119, Derek@snohomishcd.org, or stop by our Lake Stevens office.

Snohomish Conservation District has the expertise and resources to help you increase the function and value of your land. The District helps landowners on a voluntary, non-regulatory basis and our services are free.

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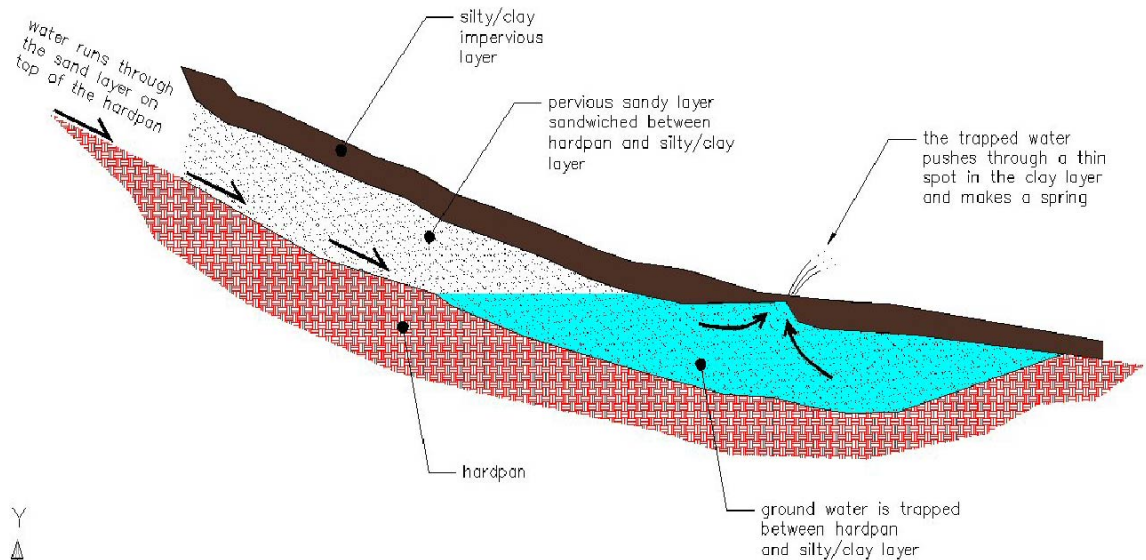
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*Improperly trying to solve drainage issues may garner you a fine, especially if you impact nearby waterways or county ditches.*  
*Photo by Lois Ruskell*



*Diagram of a 'Silt Sandwich' formation which shows how springs emerge from a slope.*