Why do you need a soil report?

A soil report helps to develop a wastewater treatment system that will protect the health of your family, your community, and the environment. Untreated wastewater from a failing system can contaminate nearby wells, groundwater, and drinking water sources.

The goal of a soil report is to determine which system will minimize the risk of drinking water contamination.

Significant health risks of contaminated drinking water include hepatitis A, diarrhea, salmonella, giardiasis, tetanus, hookworm, cholera, dysentery, typhoid fever, and staphylococcal infections.

How does the soil scientist decide which system is the best fit?

The type of system is decided based upon the properties of the soil, as well as other limitations that the site poses. Some of the most important soil properties impact the subsurface movement of water. **When choosing a system, limiting factors are considered.**

Limiting factors include (but not limited to):

- **Shallow depth to bedrock**
- **Slope**
- **Small lot size (must meet setbacks)**
- **Caves, springs, and sinkholes**
- **Distance to lakes, rivers, and streams**
- **Limiting factors in the soil**
  - **Clay type/content**
  - **Unsuitable soil structure**
  - **Fragipans or claypans**
  - **High water table**

How can site conditions determine system type?

Conventional gravity systems

Conventional systems require suitable soils and slopes to properly function. This is a very common system, however there is some variation even within this system type.

A lack of suitable slopes can be overcome with a pump-to-gravity system; however, a lack of suitable soil conditions will necessitate an advanced system. When soil conditions are unsuitable, you will often need a higher level of pretreatment to protect drinking water.

Low pressure pipe/Drip systems

These types of systems are often referred to as advanced systems. These are designed in conjunction with a qualified engineer. They can provide a higher level of wastewater treatment to overcome limiting factors of a site.

Limiting factors may include lot size, shallow depth to bedrock, clay type/content, or restrictive layers in the soil. To protect drinking water safety, these systems will distribute treated effluent evenly at a regulated rate.

Lagoons

Lagoons may be suitable when certain conditions are present: sufficient setback distances, adequate clay type/content, enough depth to bedrock, and lot size.

The presence of rock fragments and expansive clay content may greatly impact the price of a lagoon. If there are not enough expansive clays or too many rocks, then the lagoon may call for costly liners or imported clays to create a proper seal. Seasonal water tables may create hydraulic pressure which can be a possible risk to your lagoon.

Other systems: (Wetlands, Mound systems, Intermittent sand filters, etc)

These alternative systems are used when specific site conditions allow for or necessitate their use. Although these systems are not as commonplace, they are permissible in some instances to achieve treatment of effluent.

These systems may require specific maintenance procedures. Although these are not as common as the aforementioned systems, these can be used to overcome certain limiting factors on a site or create habitat as in the case of wetlands.

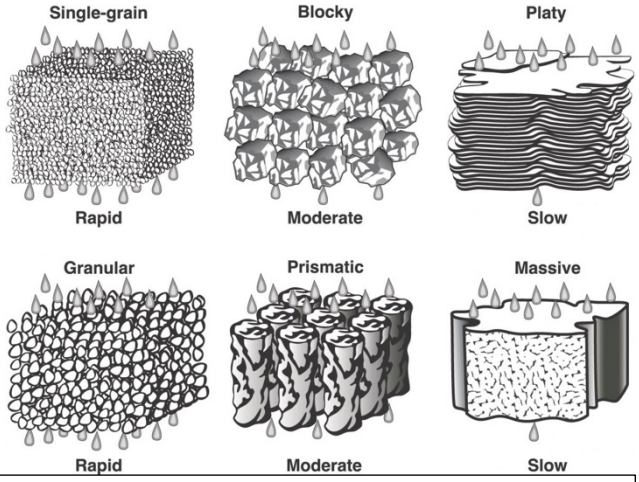
What is a limiting factor?

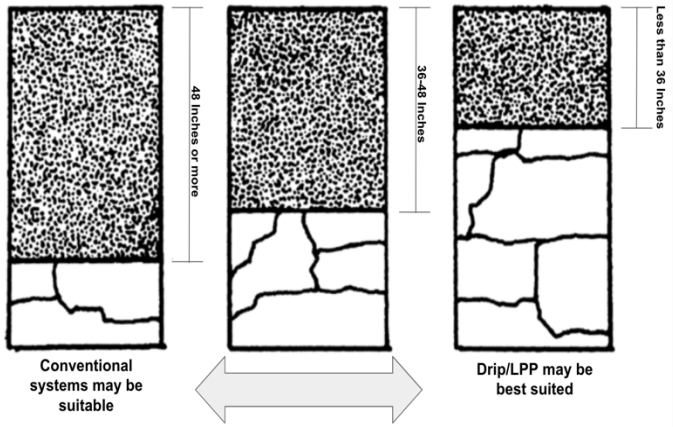
A limiting factor is a condition on a site that may relate to water quality, and thus the design of your system. These factors can include not only the qualities of your given soil, but also other features present on the property. **These other features can include shallow depth to bedrock, slope, lot size, karst features (caves, springs, and sinkholes), and proximity to surface water.**

Soil Structure

The structure of a soil can greatly impact the flow of subsurface water. Structure is essentially the arrangement of the soil particles. The arrangement of the soil heavily impacts how both water and air can move. The pore space in the soil is heavily impacted by this property.

Soils with a platy or massive structure are generally unsuitable for use in an absorption field, however advanced or alternative systems can overcome this challenge. An unsuitable structure may restrict water percolation rates, causing sewage to surface thus creating a health hazard.





Depth to a Restrictive Layer/Bedrock

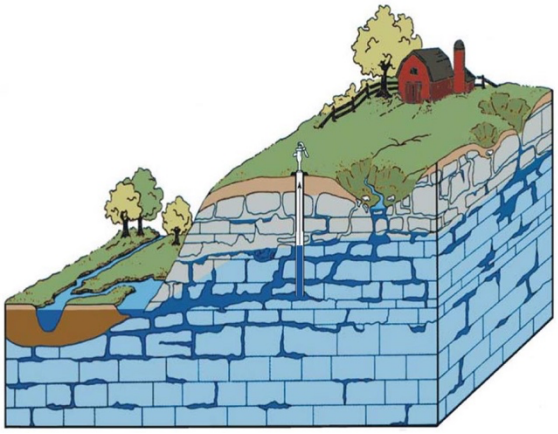
The depth to a restrictive layer is a common reason for resorting to advanced treatment systems. Certain subsurface layers restrict the flow of water. What restricts water flow may vary. It can include clay type/content (claypan) or high density (fragipan).

Shallow depth to bedrock is a common limiting factor in Missouri. Much of our bedrock can be permeable, thus presenting a risk of groundwater contamination.

Site Specific Conditions

One type of limiting factor is distance from your system to: a karst feature, property line, surface water feature, a public/private drinking water source, etc. Karst features are a common sight within Missouri.

The geologic formations we have beneath our feet may allow for quick movement of water below the surface. **On-site wastewater treatment systems may be a non-point source of groundwater contamination.**



Portions of this information obtained from:
OhioLine: Ohio State University Extension
https://ohioline.osu.edu/factsheet/aex-742
Soil structure and permeability. (Adapted from U.S. Department of Agriculture, Soil Conservation Service. 1991. Section 15 Irrigation National Engineering Handbook, 2nd ed., Figure 1-3.)

Portions of this information obtained from:
Iowa Department of Natural Resources
https://www.iowadnr.gov/environmental-protection/water-quality/private-well-program/private-well-testing/contamination-in-karst