**Informal Hydrology/Excel Lab**

**(Due Thursday, March 19th, 2015)**

# Septic System Drain field Calculator

Advantages of Using Septic Systems

* **Minimum maintenance:** Pumping once every couple years
* **Cost effective:** The cost of individual septic tanks less than central wastewater collection and treatment systems.
* **Low technology:** Septic tanks are not difficult to operate
* **Low energy requirements**

Disadvantages of Using Septic Systems

* **Potential for groundwater pollution:** This potential is related to incorrect siting based on density, soil characteristics, or both. EPA recommends a density less than or equal to 40 per square mile.
* **Require proper maintenance:** Although the maintenance requirements are not much, the maintenance schedule has to be strictly adhered to.
* **Careful cleaning required:** Very often, the cleaning process may result in groundwater contamination.
* **Requires large land areas**.

Principal Pollutants

* **Nitrates and Phosphates**
* **Heavy Metals**
* **Inorganic Ions**
* **Fecal and Coliform Bacteria**
* **Possible Synthetic Organic Chemicals**

Suitable Sites for Septic Systems

**Site not prone to flooding:** Septic systems should not be located in gullies, flood plains or hollows.

**Slope less than 10 - 15 %**

**Limiting layer more than 4 - 6 ft below drain field**: The separation is required to provide adequate distance for aerobic treatment for occur.

**High water table more than 4 ft below drain field**

**No trees**

**Sufficient area for absorption**

**Down-gradient of wells, particularly drinking water wells.**

**Percolation within suitable range:**

**Acceptable : 3 - 60 min/in**

**Marginal (too fast) : 1 - 3 min/in**

**Marginal (too slow) : 60 - 120 min/in**

**Unacceptable : < 1 or > 120 min/in**

Percolation Test for Septic Tanks

1. Dig a relatively small hole between 4 and 6 inches in diameter. The hole should be as deep as the required depth of drain field
2. If necessary, scarify the sides of the hole to remove smearing.
3. Put 2 inches of gravel in bottom.
4. Fill up to about 12 inches and all the level to fall 6 inches.
5. Measure the rate at which the water level drops.
6. Proceed until three consecutive measurements give the same rate. It may be necessary to refill the hole during the test.

Sizing Drain Fields

The sizing of drain field in Illinois is governed by the [Private Sewage Disposal Code](http://www.ilga.gov/commission/jcar/admincode/077/07700905sections.html). The required absorption area is dependent on the size of the house being treated and the percolation rate.



# Excel Template

Develop a template for sizing drain fields for residential locations.

Inputs

1. Distance the water table falls (e.g. 0.5 inches)
2. Time over which the level fell (e.g. 17 minutes)
3. Number of bedrooms (e.g. 3 bedrooms)
4. Type of system (e.g. Gravelless 8-inch )
5. Width of trench (e.g. 8 inches)

Outputs

1. Percolation rate (e.g. 34 minutes/ inch)
2. Suitability for septic systems (e.g. Acceptable)
3. Required absorption area per bedroom (e.g. 280 sq. ft.)
4. Total absorption area required (e.g. 840 sq. ft. )
5. Trench length required ( e.g. 1260 ft)
6. A graph showing the design curve and the selected area per bedroom.

* The area is the product of the trench length and the trench width
* Gravelless systems are either 8 or 10 inches wide. Gravel systems can be from 1 to 3 feet wide.

***Turn in the template for your lab grade***