

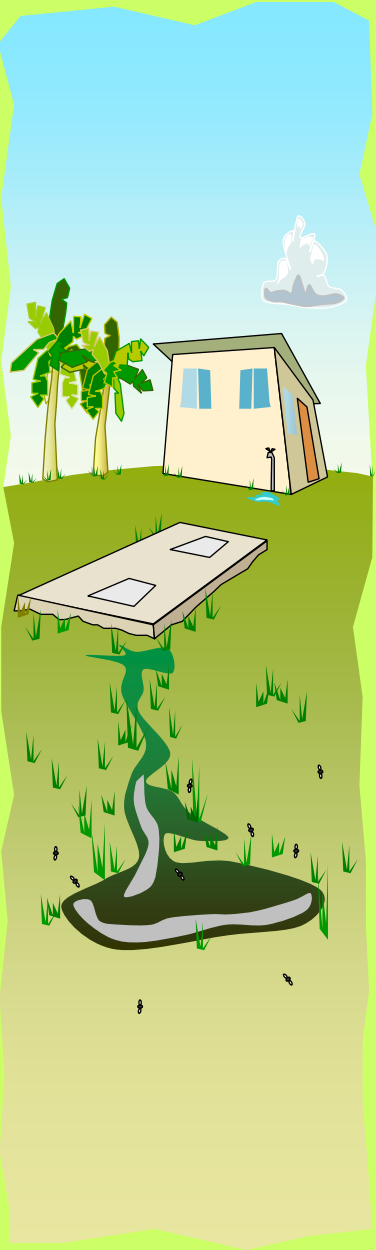
Individual Wastewater Disposal System

aka Septic Systems

**Watershed Working Group
August 2017**



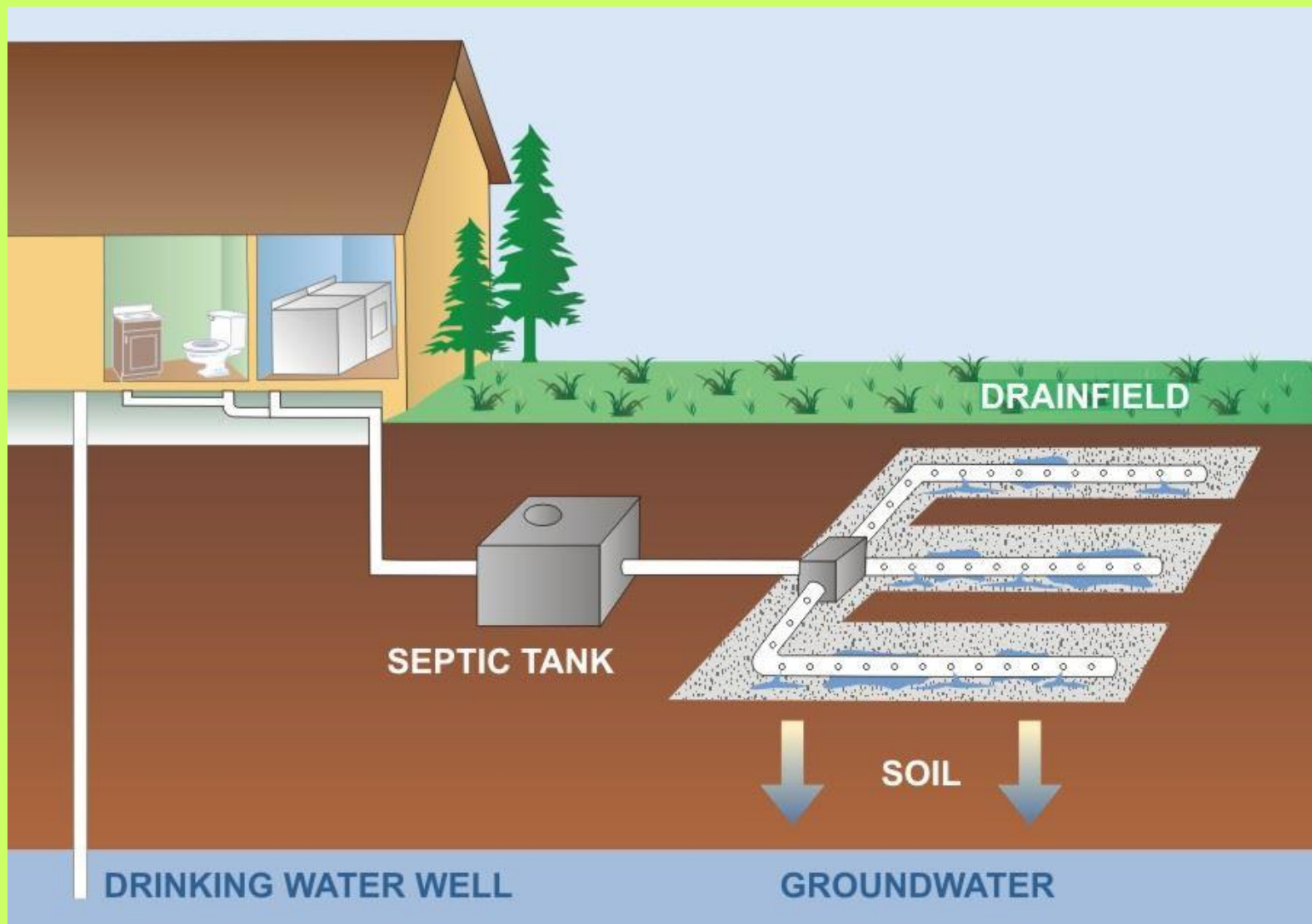
James Benavente



IWDS

Individual Wastewater Disposal System

- **A system designed and installed to treat and dispose of sewage from a single structure or group of structures using a septic tank, together with a leaching field.**



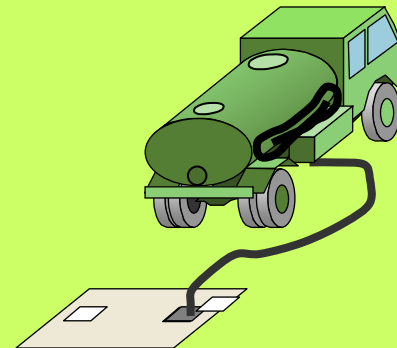
Examples





Agenda

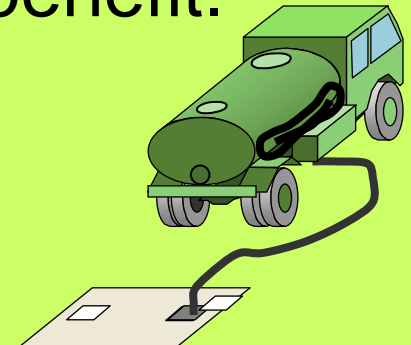
- Discuss the regulations behind the IWDS
- Improve understanding of HOW a septic system works
- Understand WHY we must follow very specific design guidelines for a septic system





Wastewater Treatment and Disposal Rules and Regulations

- Commonwealth Environmental Protection Act (CEPA) 1982.
- Protection of the groundwater and surface water.
- All IWDS (Septic Systems) shall be subject to proper design, construction, and operation to provide personal and public benefit.

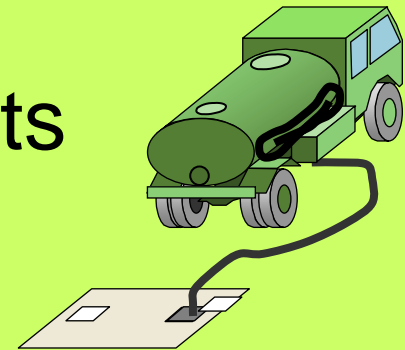
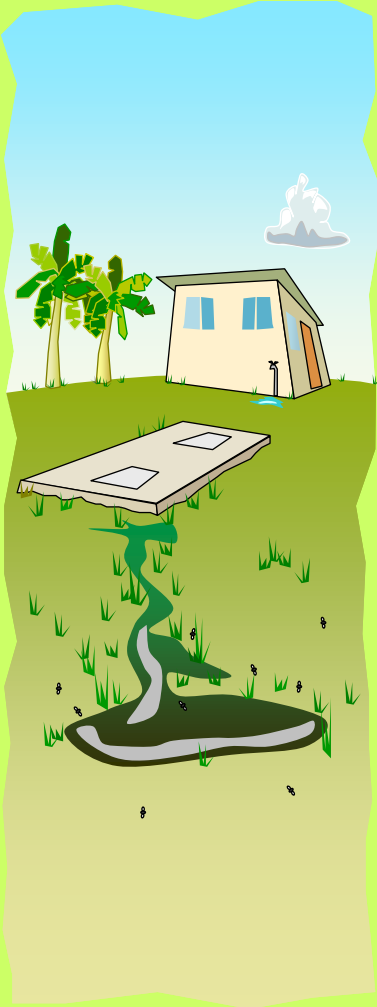




Wastewater Treatment & Disposal Regulations

Identifies:

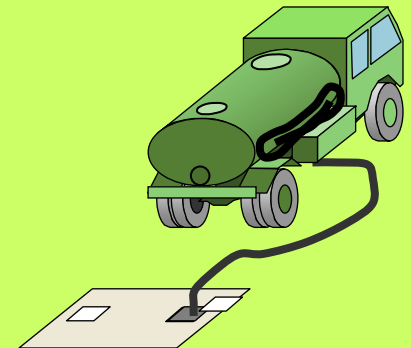
- When and where and IWDS can be built
- Process for designing and building an IWDS
- Permit requirements
- Maintenance requirements





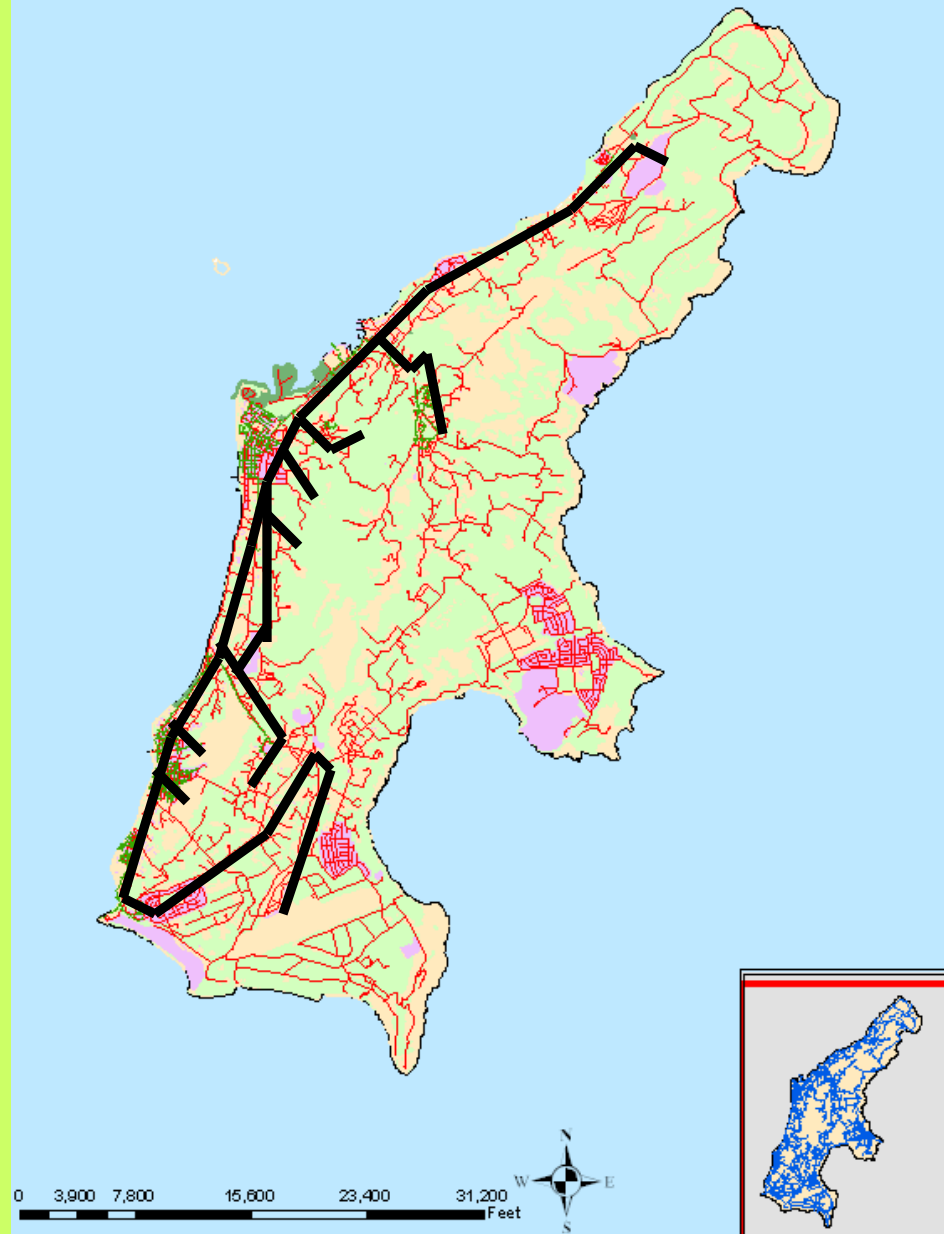
Waste in the CNMI

- When a property is within 200 feet of a sewer line, the property **MUST** be connected to the sewer system
- In places where no sewer system is available: need IWDS

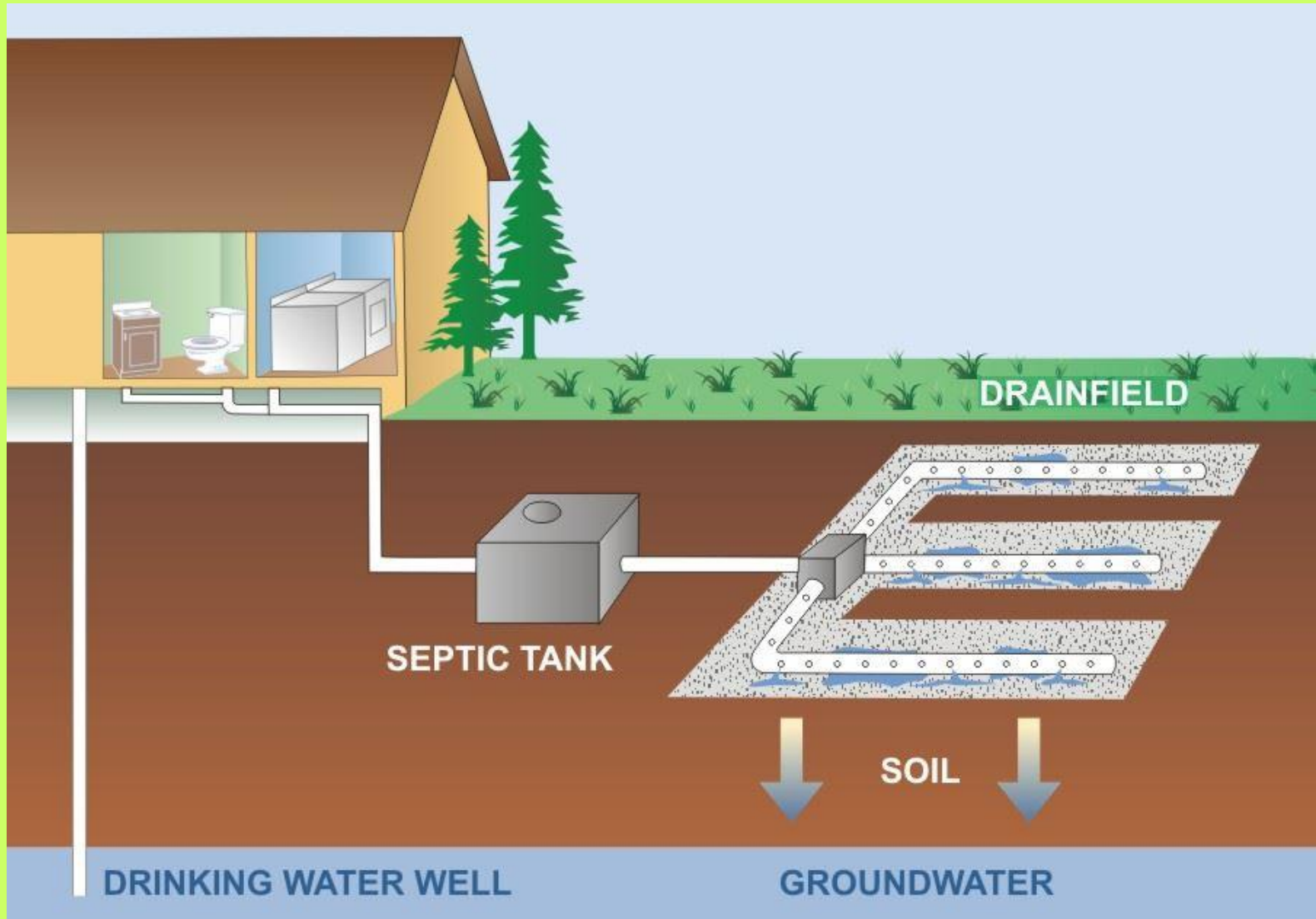




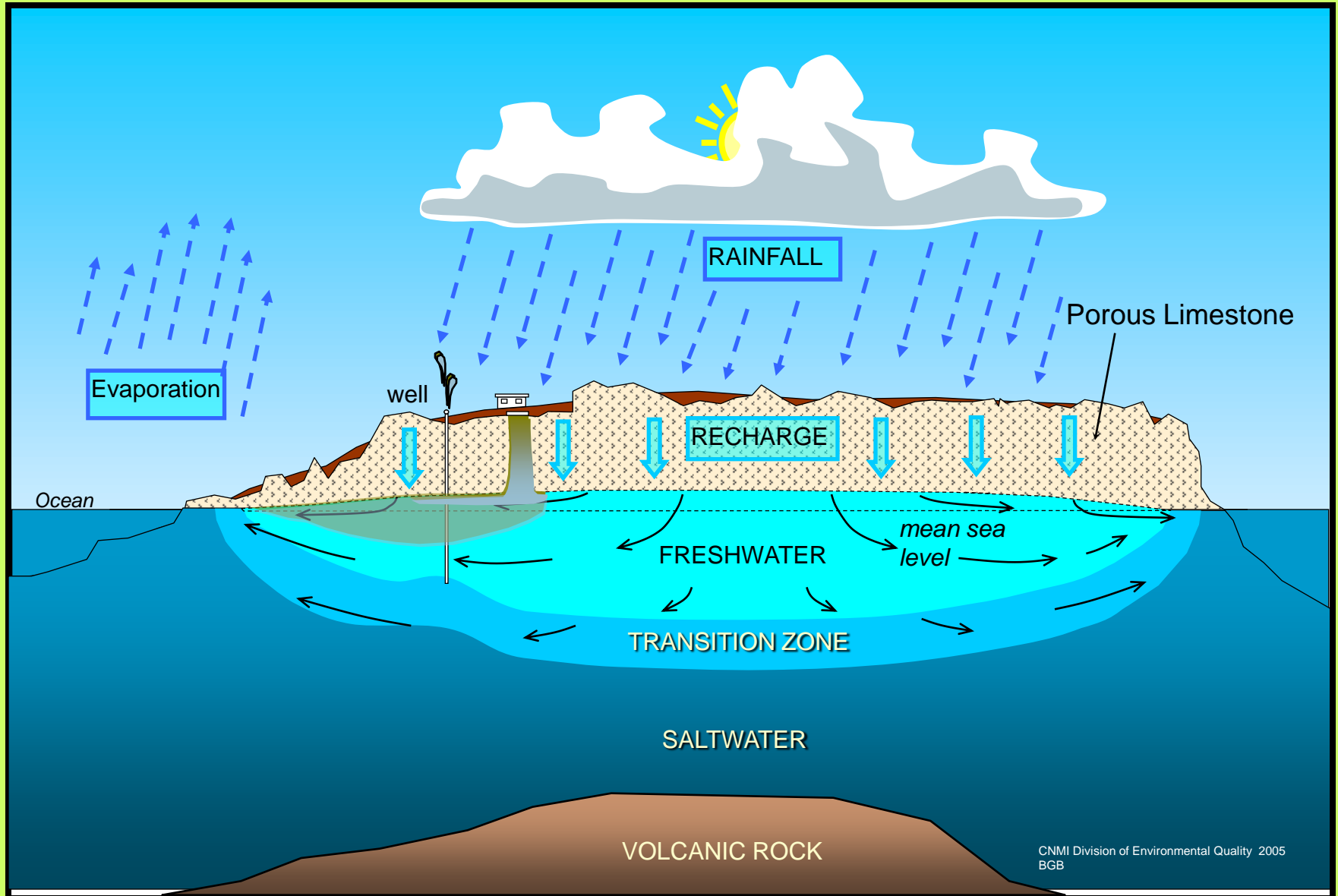
Waste in the CNMI



IWDS (Septic Systems)

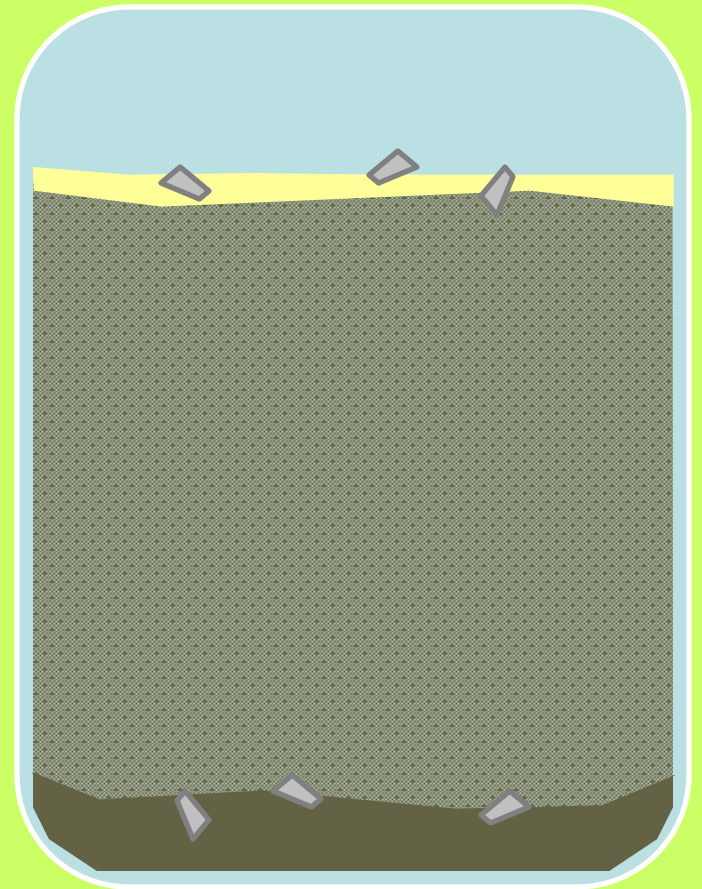


Saipan Hydrogeology



For our purposes:

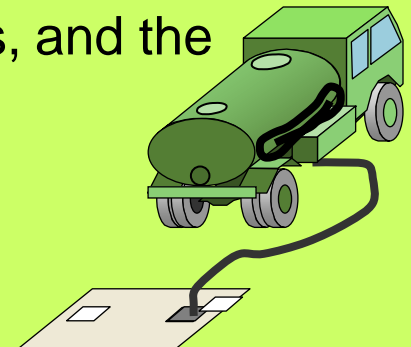
- WASTEWATER CONTAMINANTS:
 - 5 categories:
 - Stuff that sinks
 - Stuff that floats
 - Stuff that is dissolved
 - Stuff that is suspended
 - **Pathogenic** microorganisms



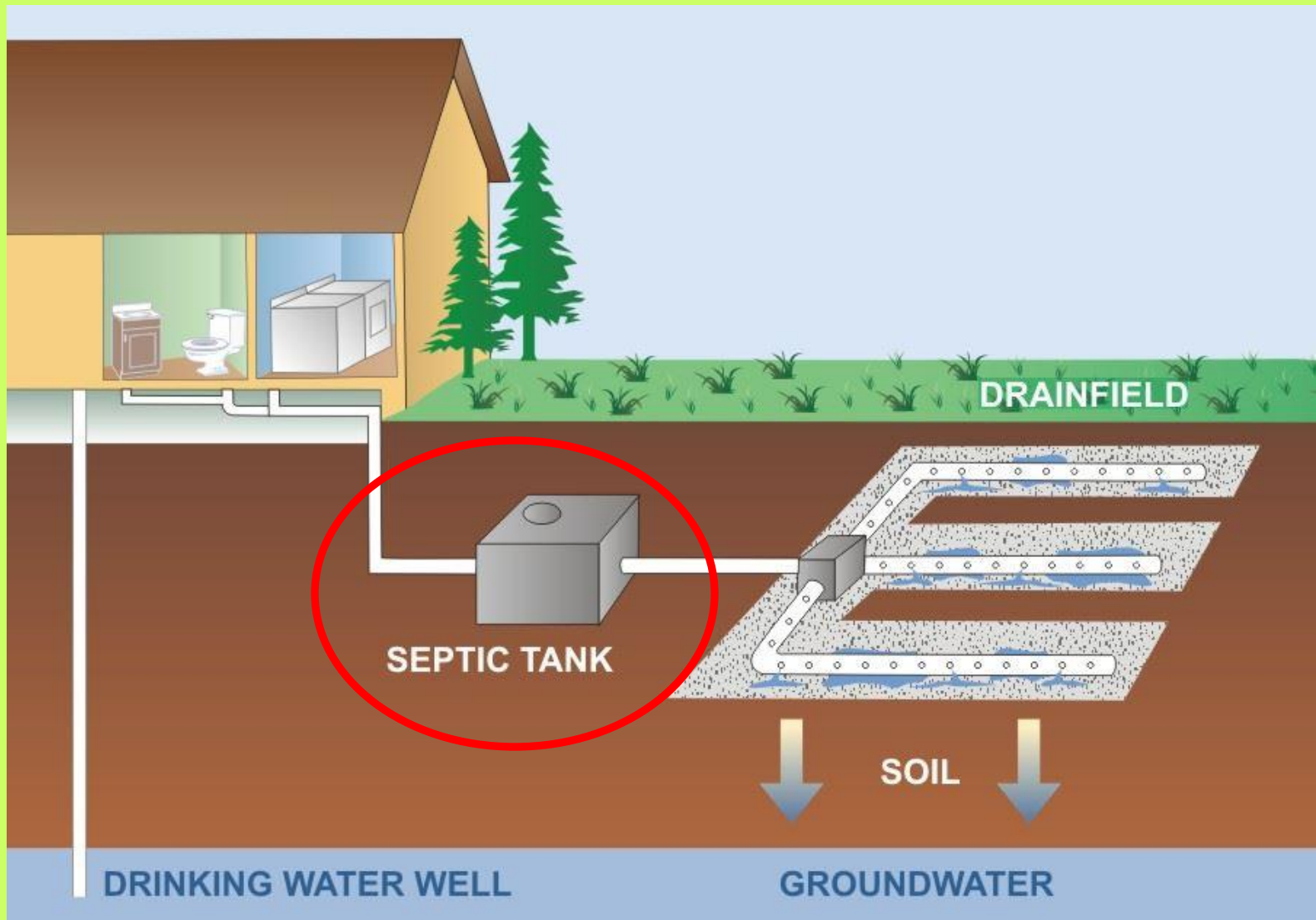


Liquid Wastes

- 2 nutrients in wastewater that give us problems
 - Ammonium (nitrogen)
 - Toxic to many organisms
 - Lasts a long time in the environment
 - Orthophosphates (phosphorus)
 - Opposite of ammonium: it is actually very beneficial to most life forms
 - Bacteria feed on orthophosphates, and the bacteria is harmful to humans



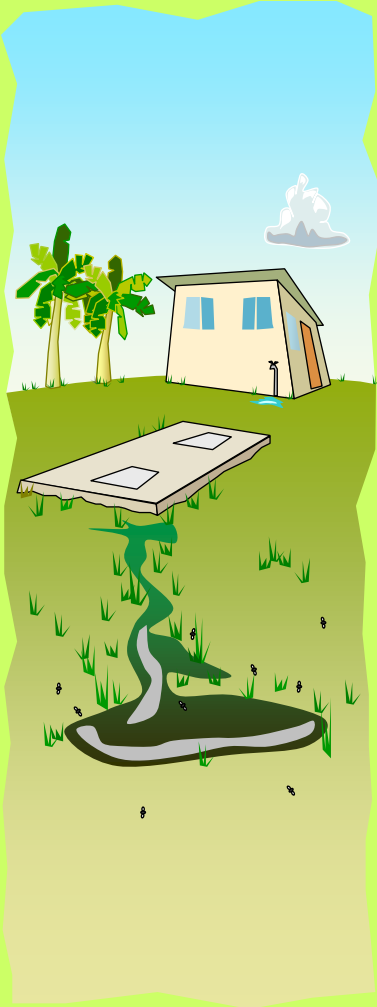
IWDS (Septic Systems)





Solid Wastes

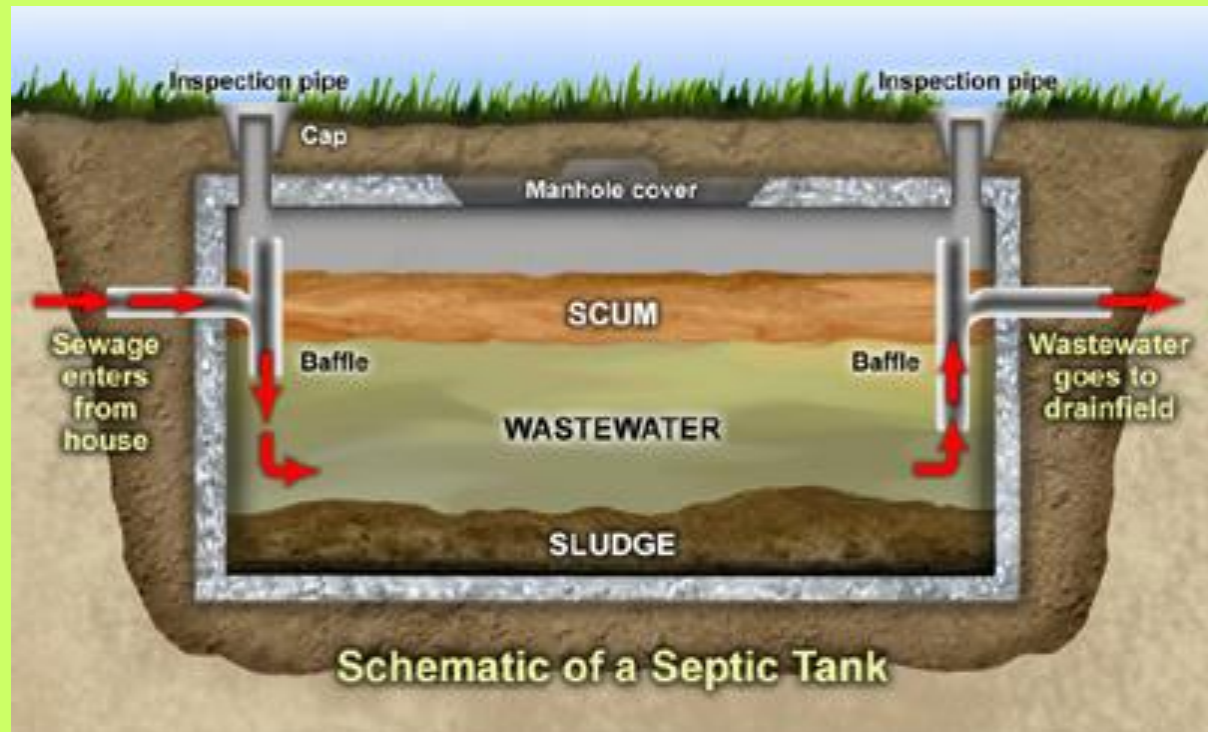
- Septic tank allows for solids to be separated from the liquid wastewater





Septic Tank

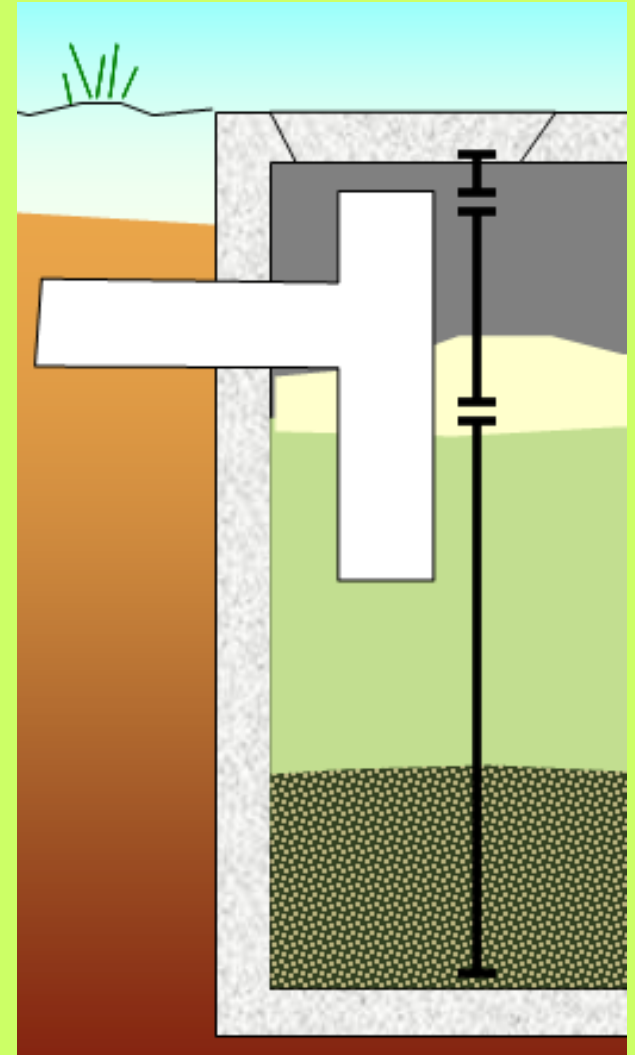
- Allows solids to separate
 - Some solids float to top
 - Some solids sink to bottom





Septic Tank

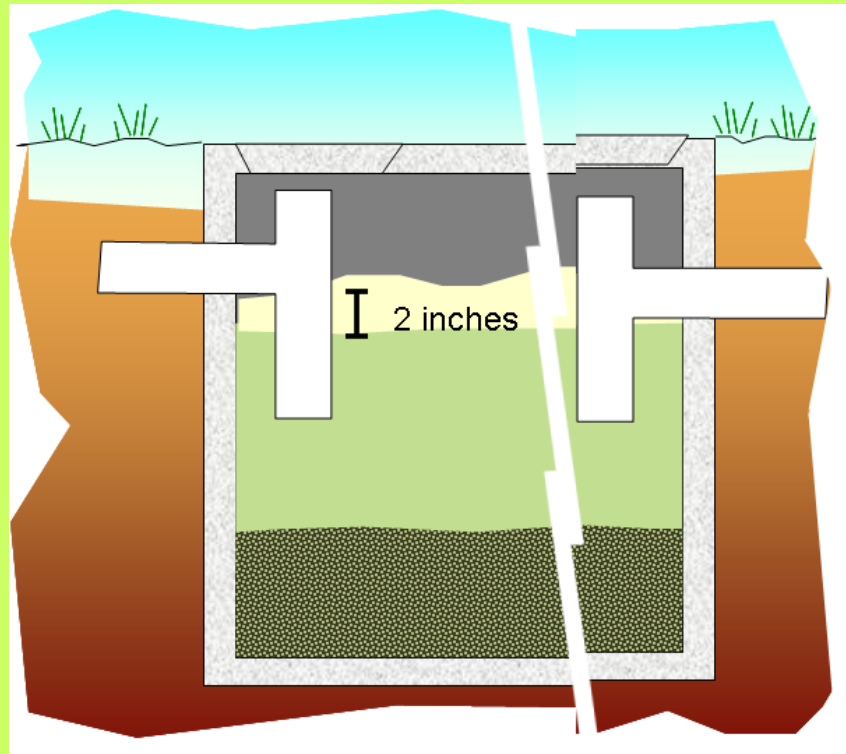
- Minimum tank height: 6ft
 - Accommodate minimum liquid depth, air spaces, and tee heights





Septic Tank Inlet & Outlet

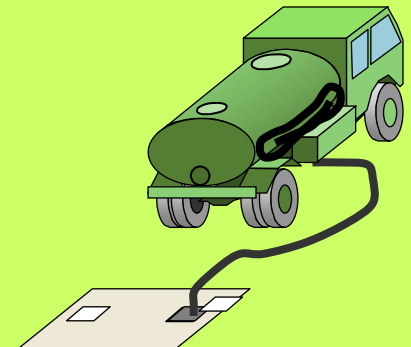
- Inlet and outlet height
 - inlet must be 2 inches above outlet





Septic Tank

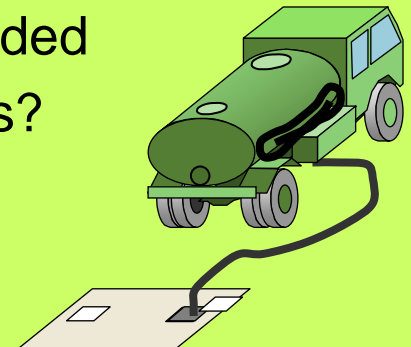
- Structural requirements:
 - Walls must be at least 6 inches thick
 - Walls must be reinforced concrete or reinforced hollow block
 - Required solid foundation, 4 inch min
 - Specific Rebar requirements for size and placement
 - #4 in most cases
 - #5 if expecting vehicle loads
 - Lined with Concrete mortar (or similar material)



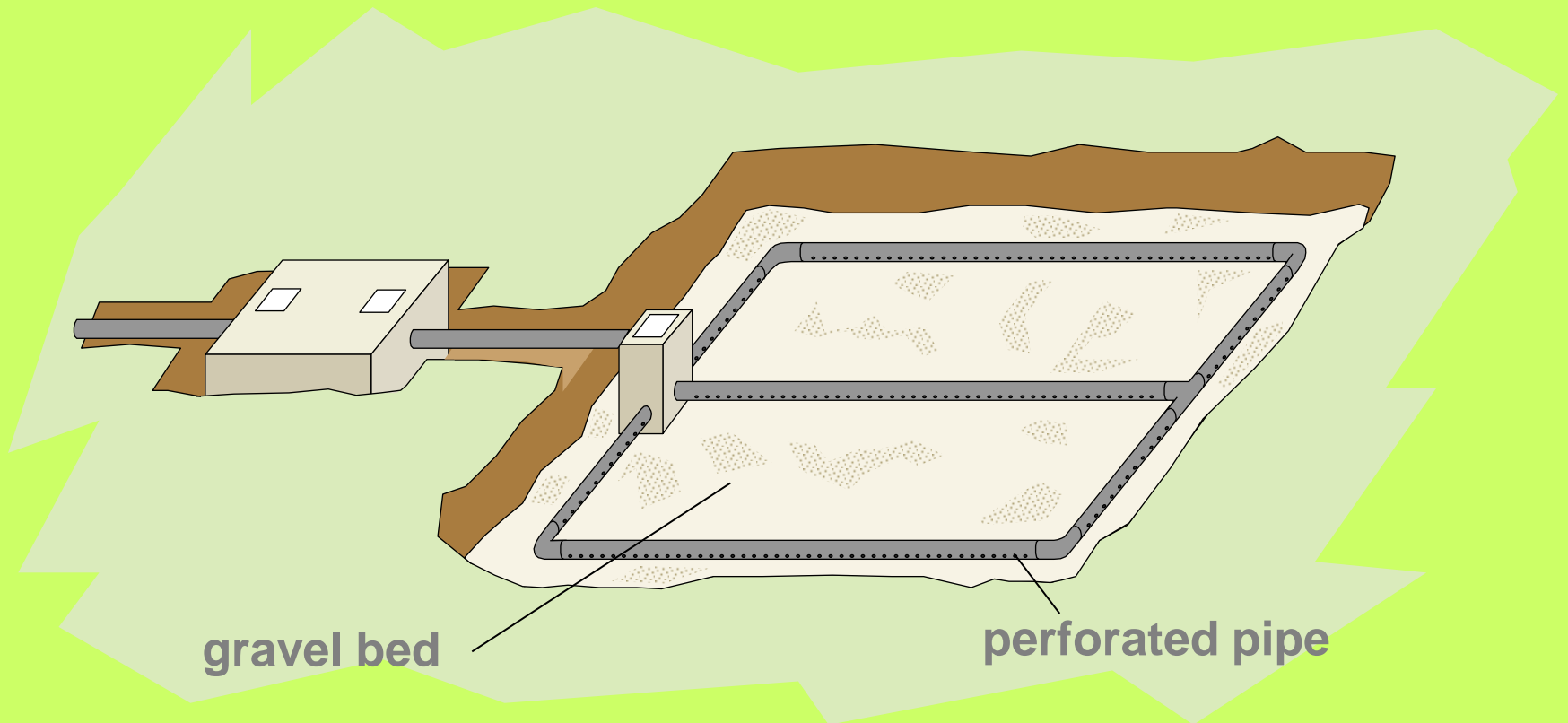


Septic Tank

- Summary:
 - If a septic tank is designed properly
 - Solids will be trapped in the tank
 - The tank will be structurally sound
 - Liquids will flow freely to leaching field
 - Treatment
 - Stuff that sinks
 - Stuff that floats
 - Stuff that is dissolved and suspended
- What about harmful microorganisms?



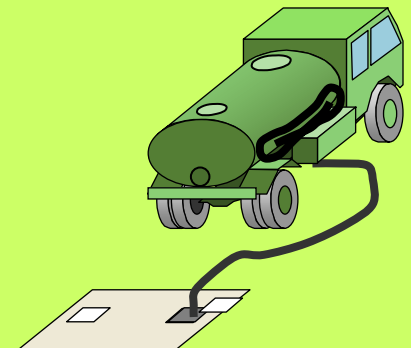
LEACHING FIELD





Leaching Field Treatment

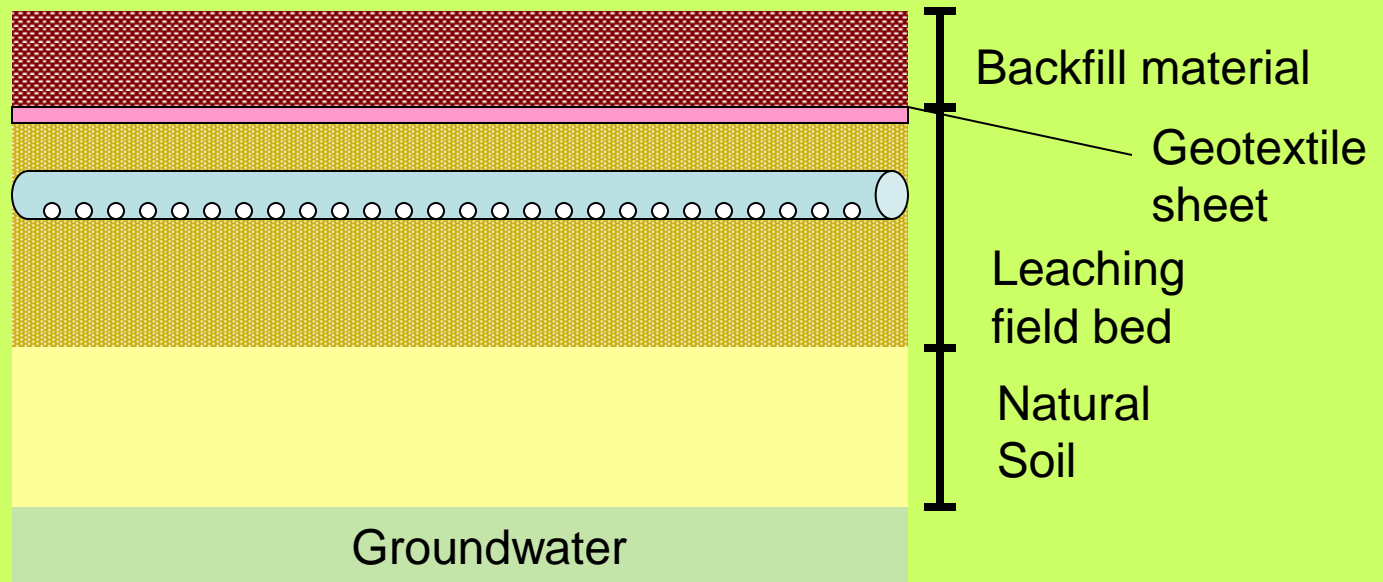
- Lots of microbes live and grow in the soil that comprises the leaching field
 - Leaching field is rich in oxygen
 - Phosphates provide “food” for microbes
- Any other contaminants are also digested by microbes





Leaching Field Design

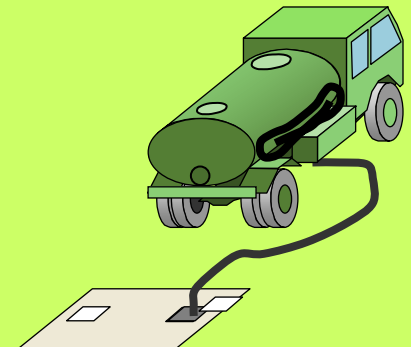
- Layers:
 - Backfill material
 - Geotextile:
 - Washed Aggregate
 - Natural Soil





Leaching Field Design

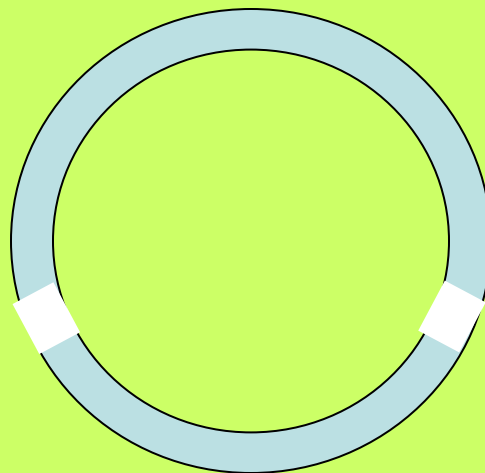
- Percolation test
 - Measures how fast water flows downward
 - Minimum: 0.67 in/hr
 - Maximum: 30 in/hr



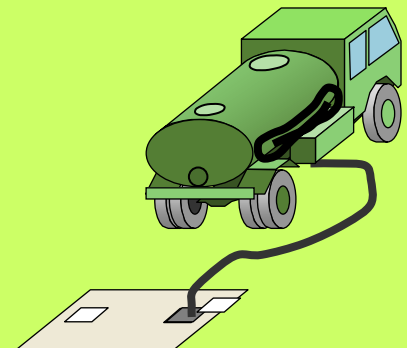


Leaching Field – Drain Pipe

- Drain line specifics
 - 4 inch PVC pipe
 - Pipe diameter is large enough to ensure that no clogging will occur
 - Can be schedule 40 or schedule 80
 - Depends on expected surface load



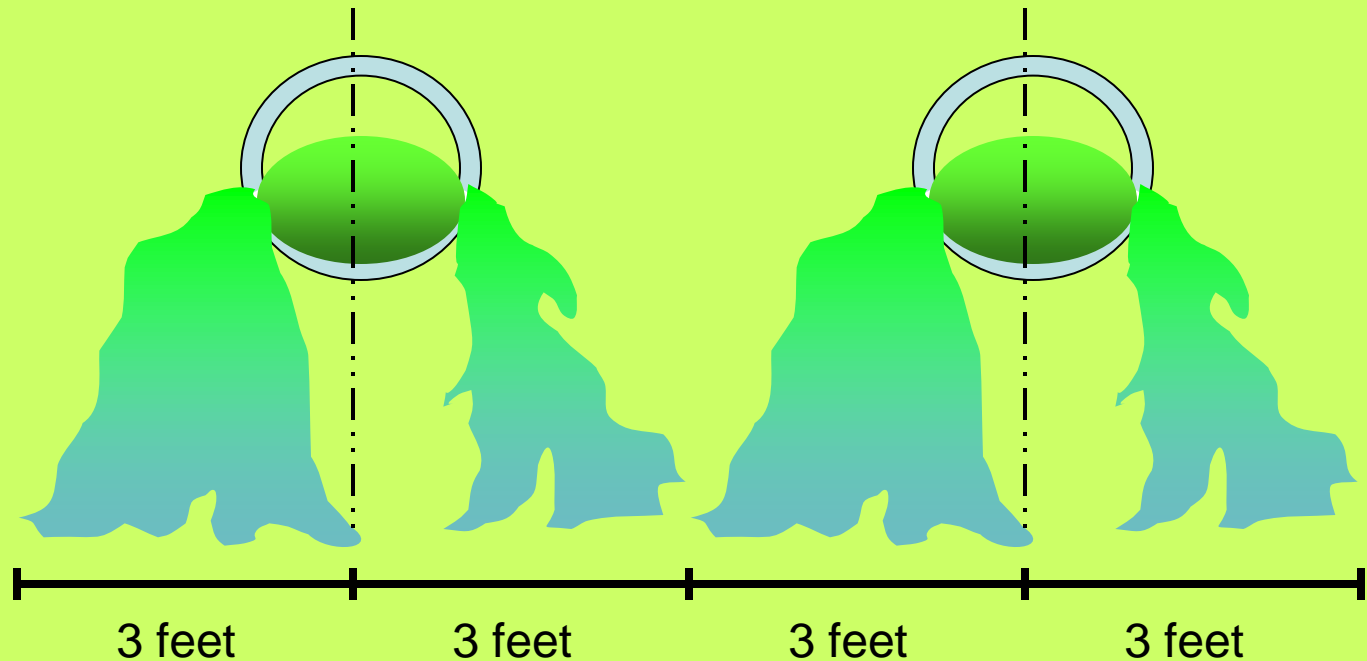
4 inches





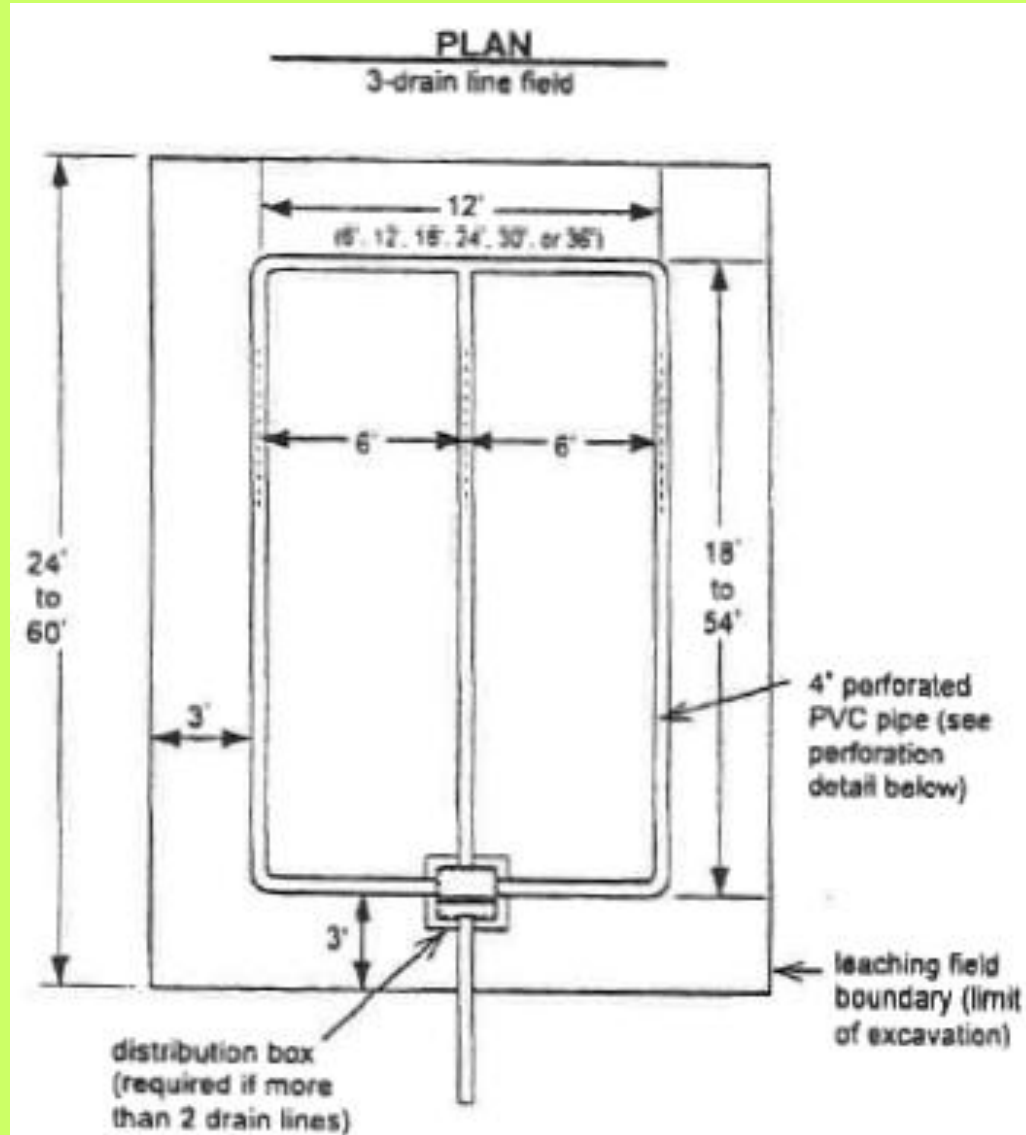
Leaching Field

- 6 ft between each line and 3 ft between line and edge of leaching field





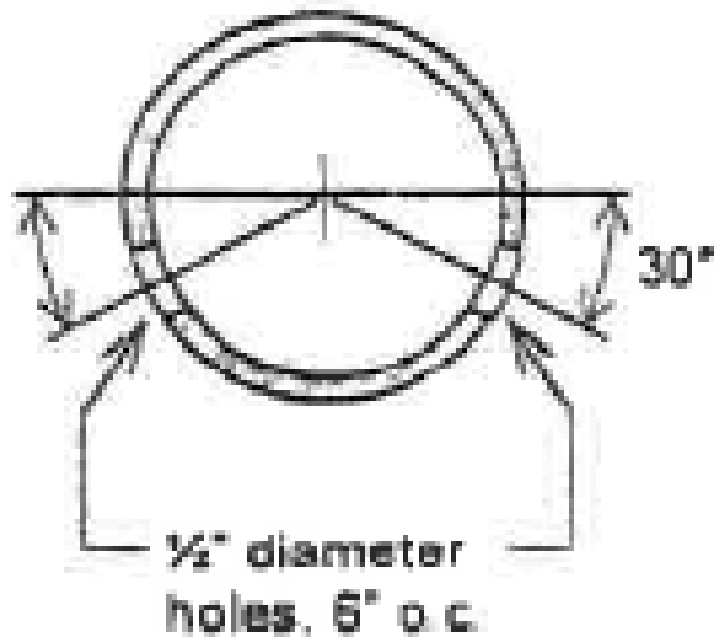
Leaching Field





Leaching Field Drain Pipe

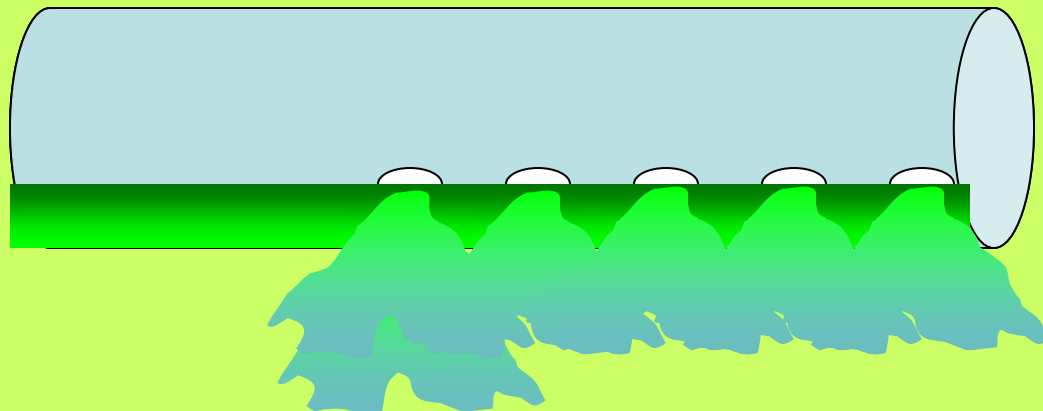
PERFORATION DETAIL cross section





Leaching Field

- Holes in pipe must be 30 degrees below centerline, $\frac{1}{2}$ inch diameter, and 6 inches apart
 - This allows waste to spread evenly all the way down the length of the pipe



If holes are at the very bottom of pipe



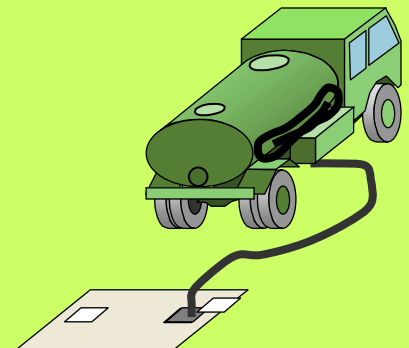
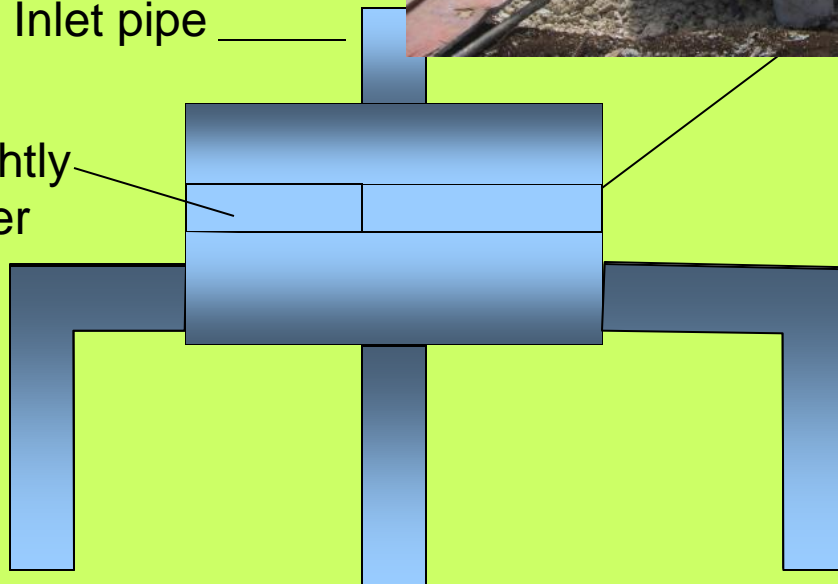
Leaching Field

- Distribution box
 - Only used if ... across more ...
 - if not perfectly ... the leaching ...



Inlet pipe _____

Slightly
lower





Leaching Field Design

- Summary
 - Leaching field is sized based on flow and percolation rate
 - Leaching field design just as important as septic tank
 - The field creates a treatment zone for useful microbes to do their thing





