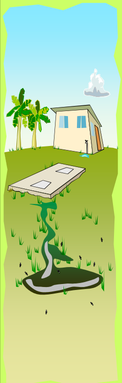
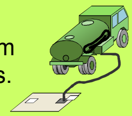


Wastewater Treatment and Disposal Rules and Regulations

- Commonwealth Environmental Protection Act (CEPA) 1982.
- All IWDS (Septic Systems) shall be subject to proper design, construction, and operation to provide personal and public benefit.
- Protection of the groundwater and surface water.
- To protect the health of the Wastewater disposal system user and his /her neighbors.

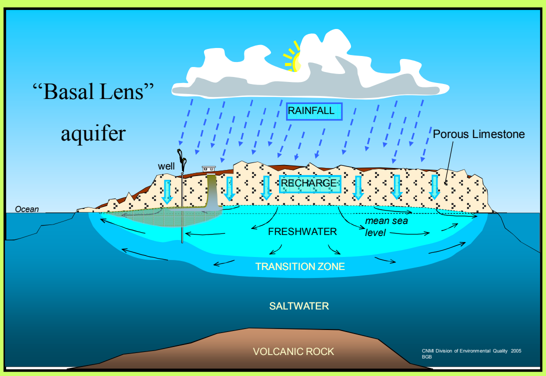


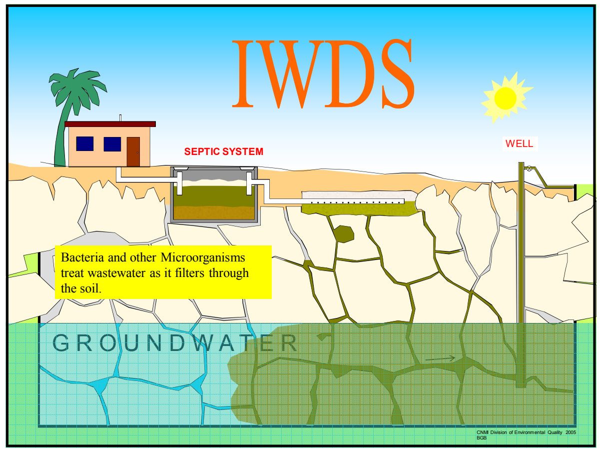
IWDS

Individual Wastewater Disposal System

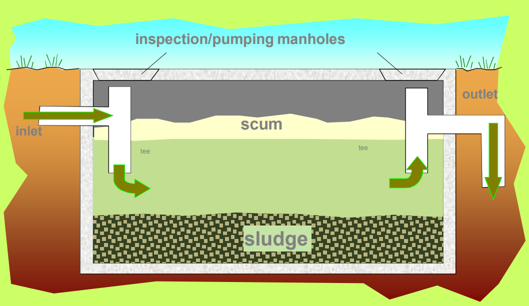
- **A system designed and installed to treat and dispose of sewage from a single structure or group of structures using a septic tank, together with a leaching field.**

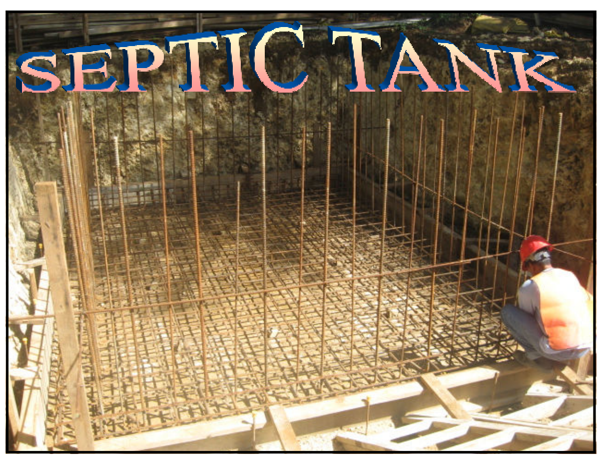
Saipan Hydrogeology



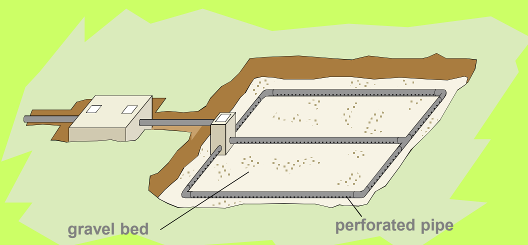


SEPTIC TANK



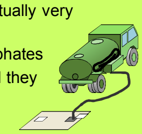


LEACHING FIELD



Why do we install an IWDS?

- 2 chemicals in our waste that give us problems
  - Ammonium (nitrogen)
    - Not easily broken down in environment
    - Even at small quantities, it is toxic to many organisms
  - Orthophosphates (phosphorus)
    - Opposite of ammonium: it is actually very beneficial to most life forms
    - Bacteria thrive when orthophosphates are introduced to a system, and they deplete oxygen, killing fish

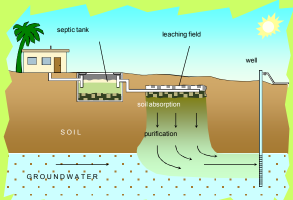


Why do we install an IWDS?

- A septic system helps us deal with these problems
  - 2 compartments

Septic tank
•Anoxic environment
•Digests ammonium

Leaching field
•Oxygen-rich environment
•Digests phosphates



Septic Tank

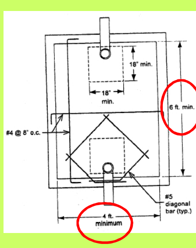
- Anoxic environment
  - Denitrifying bacteria grow in the septic tank
  - Nitrogen changes form via microbes

$$\underset{\text{ammonium}}{NH_4^+} + \underset{\text{Nitrite (also from waste)}}{NO_2^-} \rightarrow \underset{\text{Nitrogen gas}}{N_2} + \underset{\text{water}}{2H_2O}$$

  - Does not occur in an oxygen-rich environment
    - Septic tank must be air-tight

Septic Tank

- Regulations require: based on daily flow of wastewater, tank must be a certain size



•Scientific rationale: denitrification takes time to occur

Leaching Field

- 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 (hopefully)

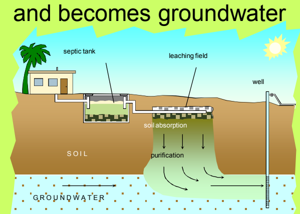
Leaching Field

- Regulations require: soil below leaching field must have a percolation rate between 0.67 inches/hour and 30 inches/hour

•Scientific rationale: microbes need time to digest phosphates as the wastewater flows downward

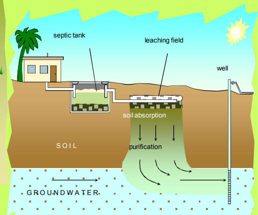
After the leaching field

- Phosphorus and Nitrogen have been removed (hopefully)
- Clean water flows downward by gravity and becomes groundwater



After the leaching field

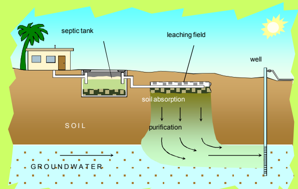
- Regulations require: leaching field must be at least 150 feet away from any state waters and significantly far from any wells



•Scientific rationale: a septic system doesn't always work 100% efficiently

Microbiology???

- Living organisms carry out the entire process
- Human Waste = Microbe food
  - We just create "living spaces" for the microbes to eat the food in



Other considerations

- Excessive volumes of water
- Large amounts of cleaning solvents
- Too much waste

Do's and Don'ts:

Septic systems are easy to take care of. There's simply not that much you need to "do." So mostly, you need to worry about what *not* to do:

Don't:

- • *Dump chemicals and business-related wastes down the drain!*
- \- Examples: paints, solvents, thinners, oil, pesticides, antifreeze, or photographic chemicals.
- • *Dump solid wastes down the drain!*
- \- Examples: diapers, cigarette butts, betel nut husks, sanitary napkins.
- • *Dump kitchen waste down the drain!*
- \- Throw leftover food in the garbage, wipe greasy pans with paper towels before washing, pour leftover cooking oil in old jars.
- • *Over-use cleaning chemicals!*
- \- "Ordinary" use of household cleaning products is not a hazard. However, if you use too much, you can kill the helpful bacteria that live in your septic system, and the system may stop working, or contaminate the groundwater.
- • *Drive over (or park on) your leaching field!*
- \- The plastic (PVC) pipes in your leaching field are easy to break. Some leaching fields are designed to be driven on, but most are not. If you don't know, don't drive on it.

Caring for your septic system

- Besides kitchen wastes, the other most common cause of septic system failure is **overloading** – with too much water use, or too many people using your building. Fix all plumbing leaks and don't leave water running if you don't need to. Likewise, don't increase your water usage by changing the use of your building. For example, renting out your single-family residence as a "barracks" always results in more water use than the house septic system was designed to accommodate. Check with DEQ first to find out what your system can handle.
- Septic tanks should be inspected by the owner at intervals of not more than three (3) years, to determine the rates of scum and sludge accumulation. The inlet and outlet structures and clean-outs should be inspected for damage after each pump.

* "IWDS Failure" or "System Failure"

- The IWDS refuses to accept sewage effluent at the rate of design application, resulting in interference with plumbing fixture use.
- Sewage effluent exceeds the infiltration capacity of the soil resulting in objectionable odors, ponding, seepage, or other discharge of the effluent to the surface of the ground or surface waters.
- Effluent discharges, from the absorption system result in contamination of a potable water supply, ground water, or surface water.

Penalties and Fines!

- **Any person who Knowingly and willfully commits an act in violation of the IWDS Rules and Regulations, and who is found guilty by court of competent jurisdiction may be punished by fine of not more than $25,000 for the continuance of the violation.**