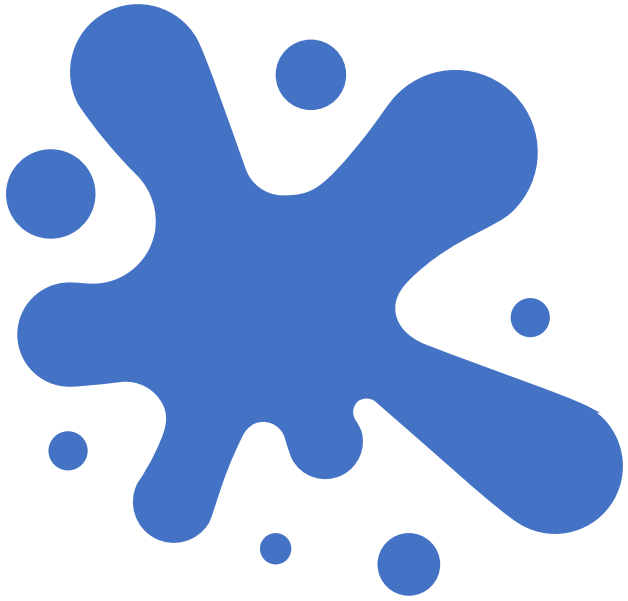
W12: Water, Part 2

Topics

- Recreational Water
- Septic Tanks and Percolation Tests
- Waste Treatment Centers



Recreational Water

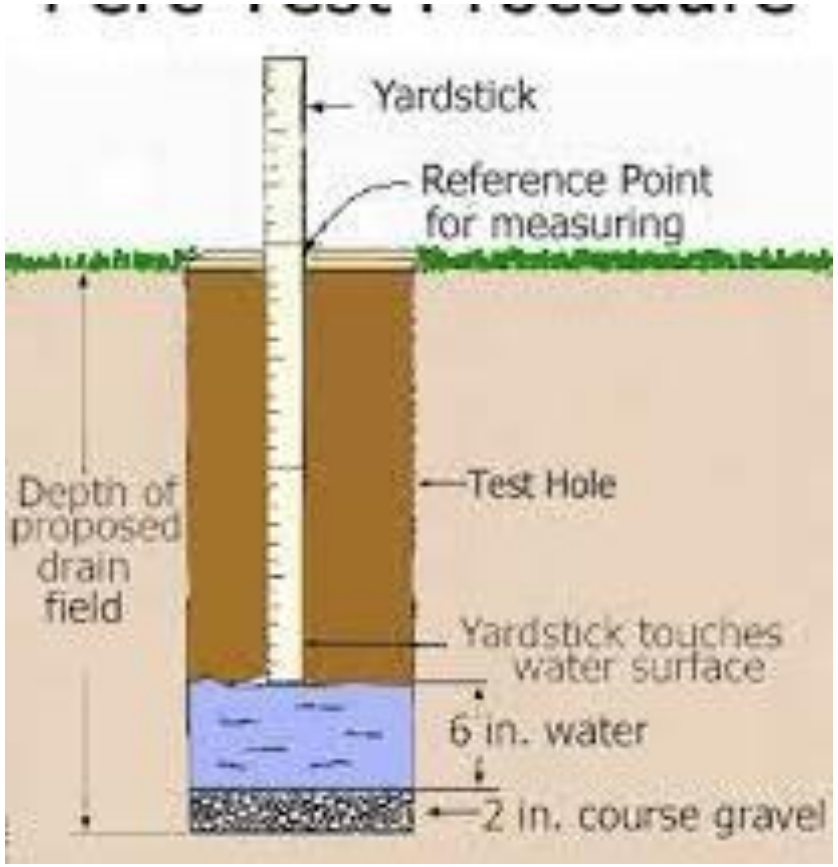
- Just like drinking water, recreational water should contain limited bacteria
  - Even if a pool has chlorine bacteria buildup is a concern

Percolation "Perc" Tests

- Purpose:
  - Examine how rapidly water is absorbed into the ground
    - Important for drain runoff and septic systems
  - Very important if you are building in a rural area

- Water permeable substances increase absorption rate, less-permeable decrease (clay)

- Read "W12 Drain Fields" to understand how to perform a perc test
  - Simplified: Digging a hole and filling it with water, using a measuring stick to time how long it takes the water level to lower.



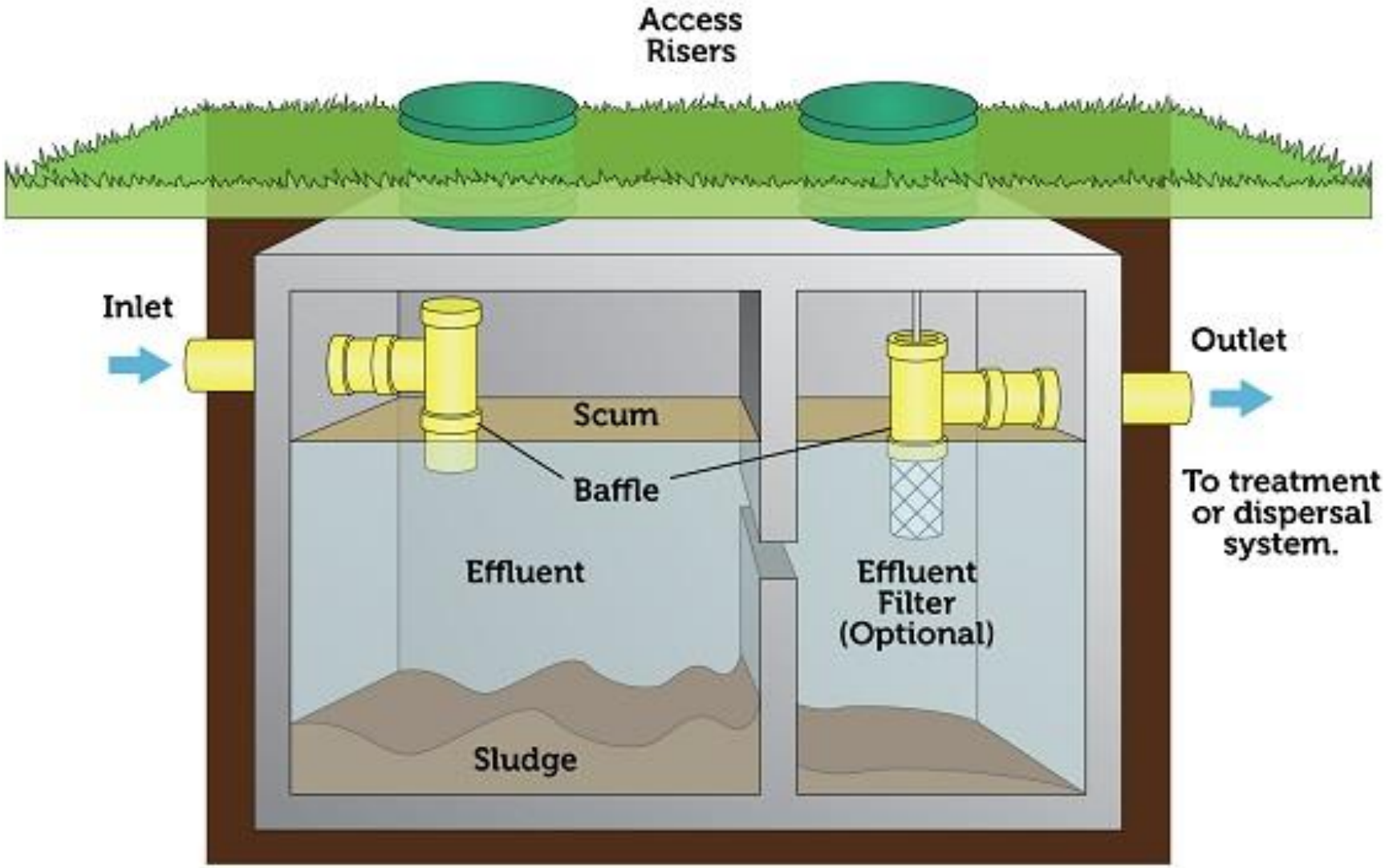
Septic vs. Sewer Systems

- Septic vs. Sewer
  - Septic treats wastewater onsite (owner)
  - Sewer transports the waste to a central location for treatment (city/county)

- Septic Advantages:
  - More environmentally friendly (Less water and less energy)
  - Cost, no monthly sewer bill from city/county

- Septic Disadvantages:
  - Expensive Maintenance, Owners oversee maintenance
  - Requires dedicated space on the property for tank and drain field

Septic Tank



Please note: The number of compartments in a septic tank vary by state and region.

Septic Systems

Utilize the "How The Septic System Works" and "Types of Septic Systems" handout

Typically consists of a tank, drainage field, and soil surrounding entire system

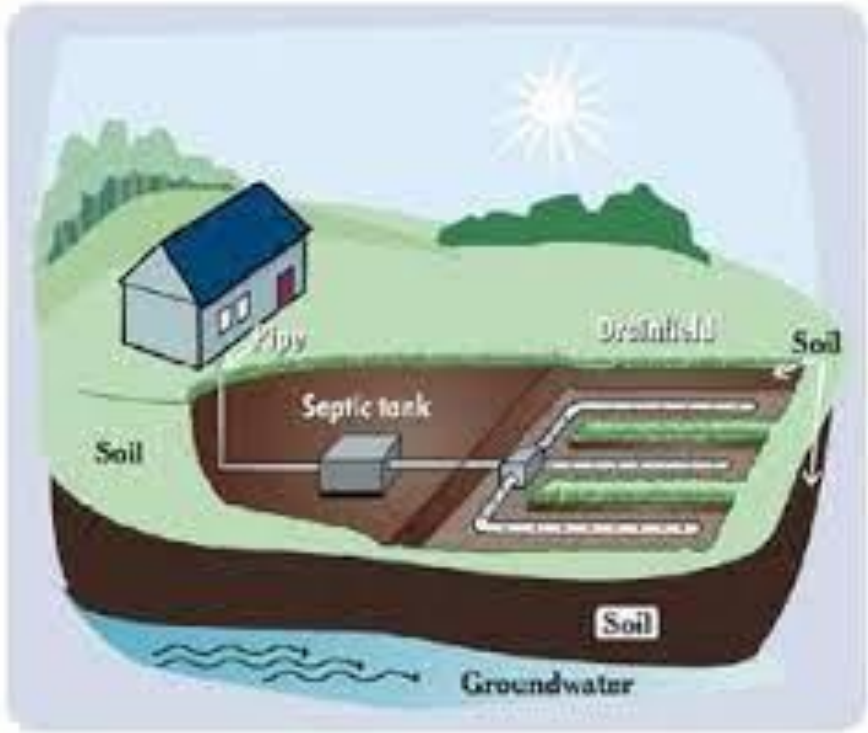
Sealed off container is important

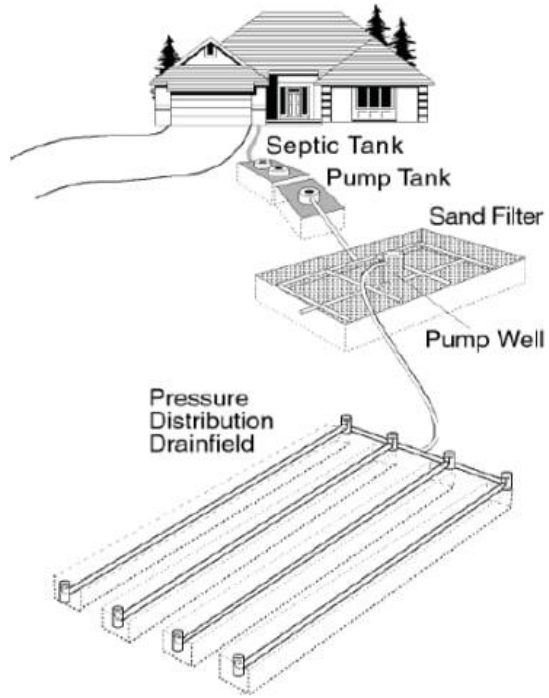
- Anaerobic bacteria digest solid particulates
- Strong drain cleaners can damage ecosystem within the tank

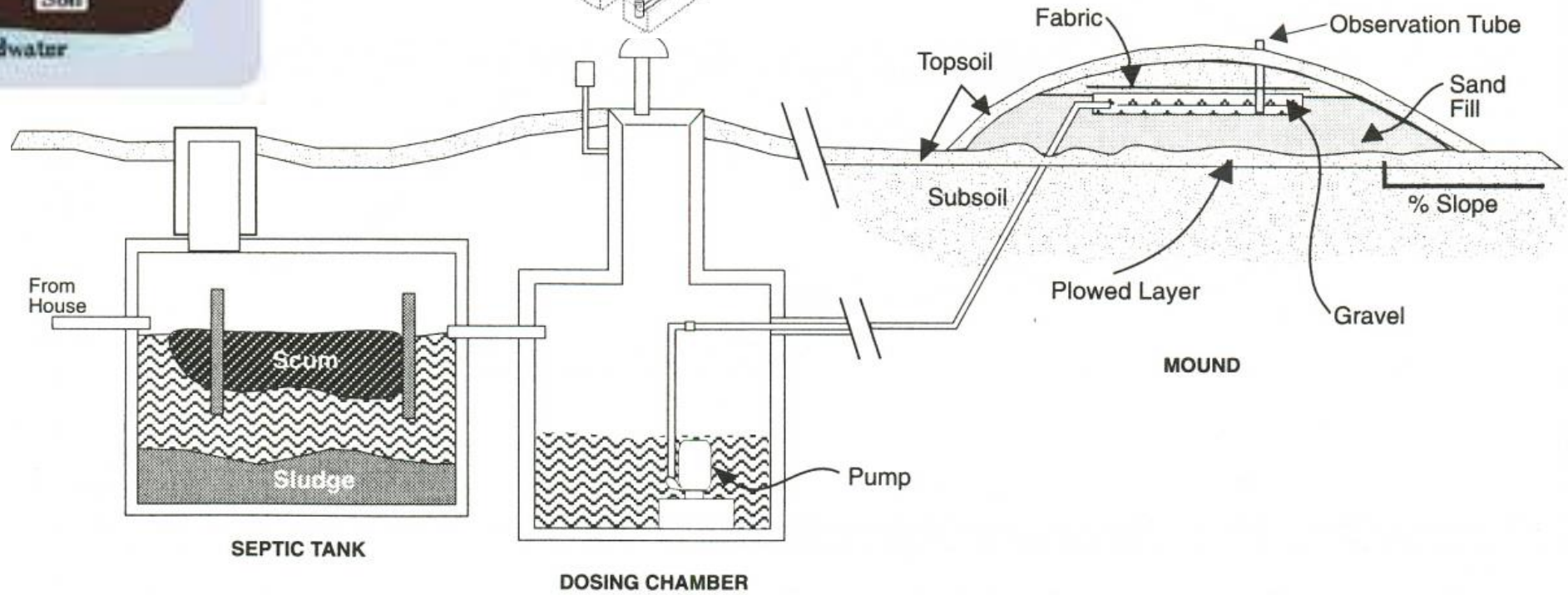
Septic System Drain Fields

- Liquid waste from septic tank is distributed throughout the field

- Types of Drain Fields:
  - Gravity system
    - Uses a septic tank
    - Requires a distribution box, spread flow evenly, and that the water can run downhill
  - Sand-lined trench
    - Uses a septic tank, pump tank, and sand filter tank before it gets to the field
    - The sand treats waste prior to reaching drain field
  - Mound
    - Uses the same components as gravity and sand-lined
    - Possesses mound that contains network of pipes to disperse waste
    - Great for environments with high clay content, and a high water table


Pipe
Drainfield
Soil
Septic tank
Soil
Soil
Groundwater


Septic Tank
Pump Tank
Sand Filter
Pump Well
Pressure
Distribution
Drainfield


From
House
Scum
Sludge
SEPTIC TANK
Pump
DOSING CHAMBER
Fabric
Observation Tube
Topsoil
Sand
Fill
Subsoil
% Slope
Plowed Layer
Gravel
MOUND

Wastewater Treatment (City Sewer)

- Be sure to watch:
  - "Wastewater Generation and Collection"
  - "Wastewater Treatment and Discharge"
- The average person produces roughly 125 gallons of wastewater/day
- All city wastewater is sent to a central waste treatment center
  - Typically uses Aerobic bacteria

Treatment Types

- Typical flow of filtering the largest objects first, smallest last
- After each type of treatment, collected sludge is sent to digestors

- Primary
  - Pre-filters (Barrel screens)
  - Primary Settling Tank (Scrapers)

Secondary

- Trickling filter
- Aeration/Oxidation ditch
- Clarifiers
- Activated Sludge
- Stabilization pond

- Tertiary
  - Sand filtration
  - Disinfectant
  - Carbon bed filtration

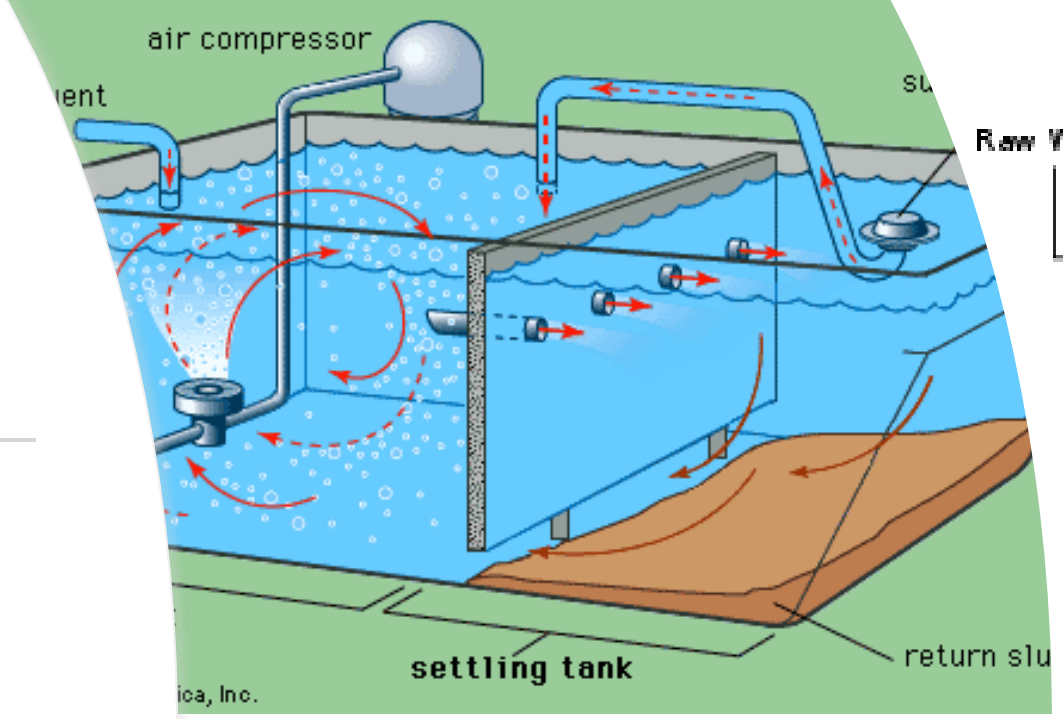
Primary Treatment

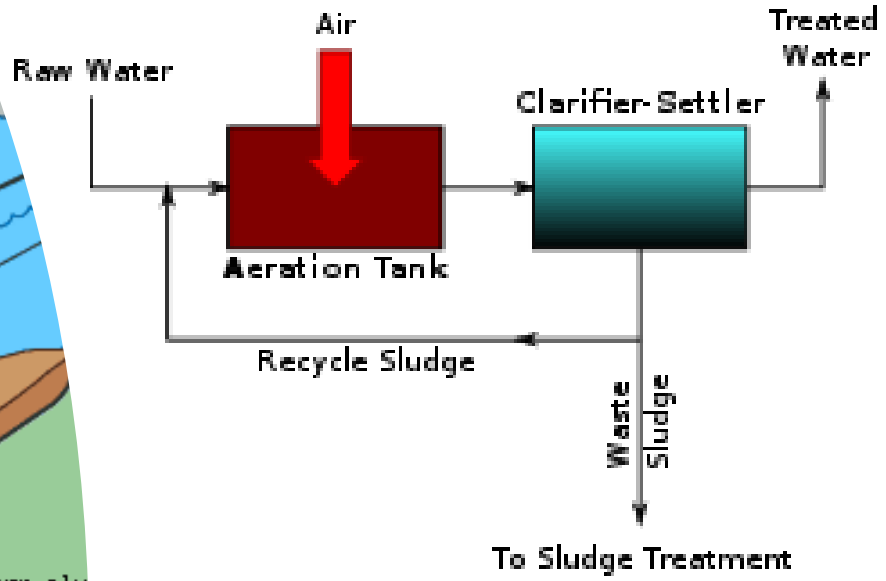
- Pre-filters
  - Bar/Barrel Screens
    - Water runs through metal screen to separate large particles
- Primary Settling Tank
  - Scrapers

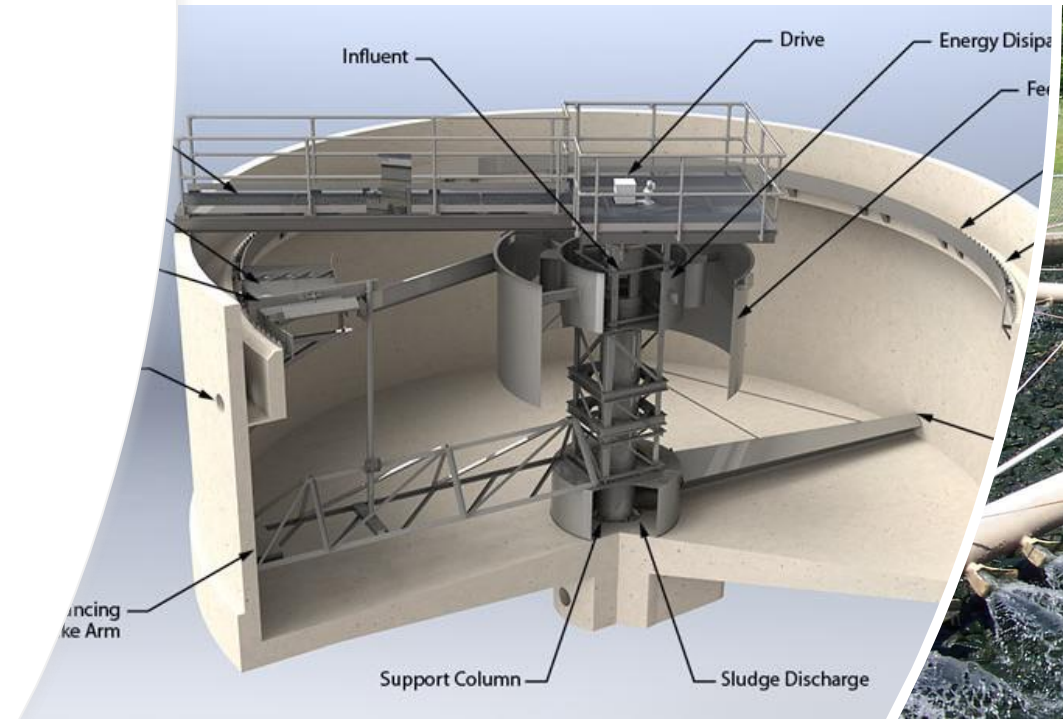
Secondary Treatment

- Large basins of water, utilizing aerobic bacteria

- Trickling filter
  - Trickles water to help Aerobic bacteria
- Aeration/Oxidation ditch
  - Pumps in air
- Clarifiers
  - Like settling tank
  - Arms collect flocculation (on top), and sedimentation (on bottom)
- Activated Sludge
  - Recycling sludge
- Stabilization pond
  - Secondary settling tank







Tertiary Treatment

- Using gravity to filter through a substance (Pur/Brita Filter)
  - Sand filtration
  - Carbon bed filtration

- Disinfection
  - Ozone
  - UV lamps