WHAT'S IN THE WATER?

PRIVATE SEPTIC SYSTEMS

BUCKINGHAM TOWNSHIP EAC

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BUCKINGHAM TOWNSHIP EAC

with Bucks County Master Gardeners

POLLINATOR & BUTTERFLY GARDEN SALE!

Interested in *native plants?*

Want to help our birds & bees **but not sure how?**

The Buckingham Township Environmental Advisory Commission (EAC) and the Bucks County Master Gardeners have created a **ready-to-plant pollinator/ butterfly garden** just for you!

- Native to Bucks County
- Deer Resistant
- Attracts Birds, Bees & Butterflies

Pre-designed 6-plant garden ONLY $10

Includes 6 beautiful, carefully chosen native plants:

PICK-UP DATE:

May 16

10:00 AM – 12:00 PM

Hansell Park Pavilion

Payment by cash or check at pick-up site only.

Bee there!

CLEAN WATER IS EVERYONE'S BUSINESS

LESS THAN THREE PERCENT OF OUR PLANET'S WATER IS FRESH WATER, AND LESS THAN HALF OF THAT IS AVAILABLE AS A LIQUID; THE REST IS LOCKED AWAY AS ICE IN POLAR CAPS AND GLACIERS. FOR THESE REASONS, FRESHWATER IS A PRECIOUS RESOURCE.

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BUCKS2040 VISION PLAN
RESIDENT SURVEY

91% of Respondents Agreed or Strongly Agreed that Bucks County Future should include access to Clean Air and **Water**

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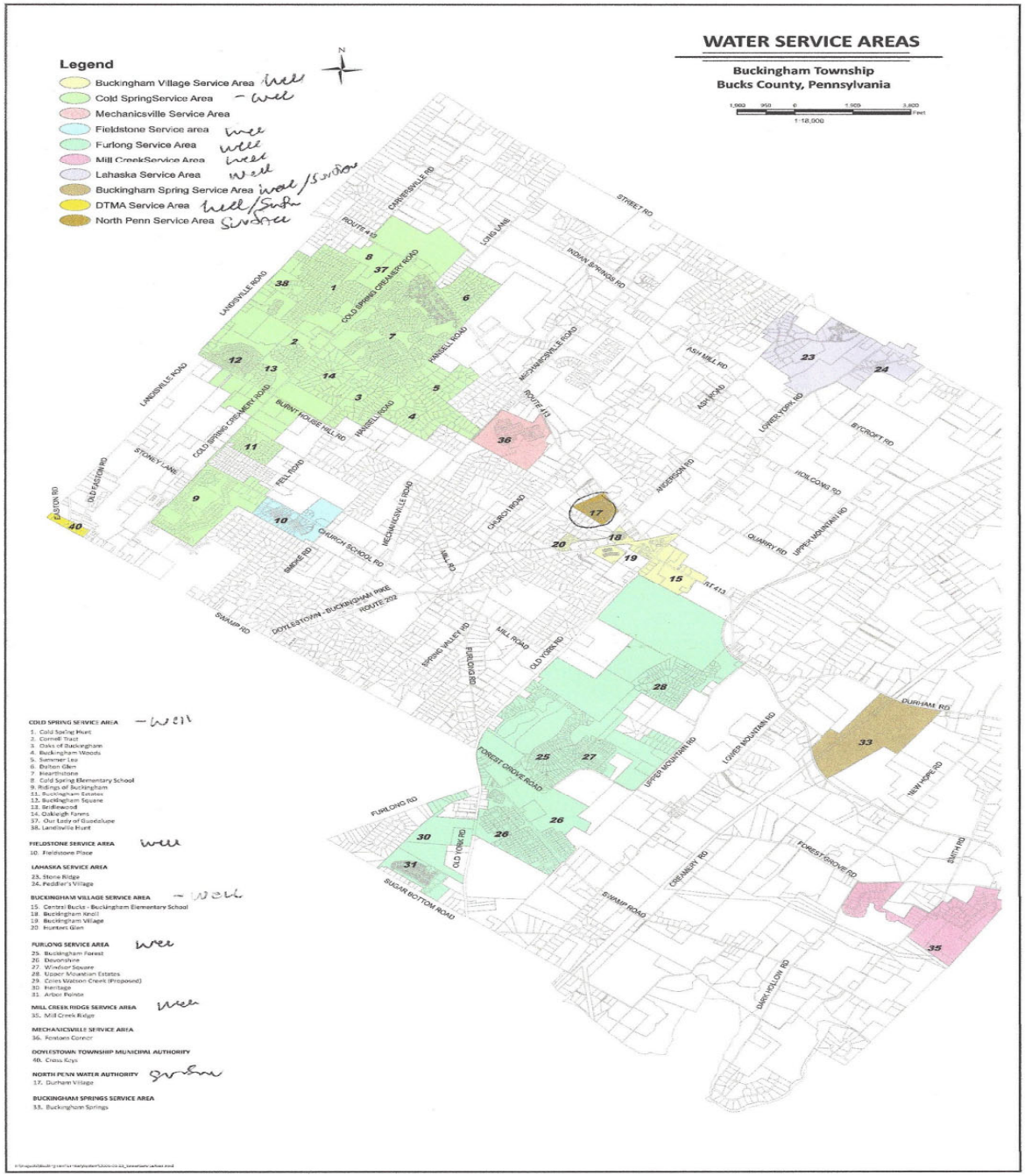
Private Septic Systems in PA

- About 26 percent of Pennsylvania households rely on an on site septic system, including septic tanks and cesspools, to manage their sewage. Most of these homes also have a private well for their drinking water.
- There are over 1 million septic tanks in PA treating about 300 million gallons of waste per day


WATER SERVICE AREAS
Buckingham Township
Bucks County, Pennsylvania
Legend
Buckingham Village Service Area well
Cold SpringService Area well
Mechanicsville Service Area
Fieldstone Service area well
Furlong Service Area well
Mill CreekService Area well
Lahaska Service Area well
Buckingham Spring Service Area well/Surface
DTMA Service Area well/Surface
North Penn Service Area Surface
COLD SPRING SERVICE AREA well
1. Cold Spring Hunt
2. Cornell Tract
3. Oaks of Buckingham
4. Buckingham Woods
5. Summer Lea
6. Dalton Glen
7. Hearthstone
8. Cold Spring Elementary School
9. Ridings of Buckingham
11. Buckingham Estates
12. Buckingham Square
13. Bridlewood
14. Oakleigh Farms
37. Our Lady of Guadeloupe
38. Landisville Hunt
FIELDSTONE SERVICE AREA well
10. Fieldstone Place
LAHASKA SERVICE AREA
23. Stone Ridge
24. Peddler's Village
BUCKINGHAM VILLAGE SERVICE AREA well
15. Central Bucks - Buckingham Elementary School
18. Buckingham Knoll
19. Buckingham Village
20. Hunters Glen
FURLONG SERVICE AREA well
25. Buckingham Forest
26. Devonshire
27. Windsor Square
28. Upper Mountain Estates
29. Coles Watson Creek (Proposed)
30. Heritage
31. Arbor Pointe
MILL CREEK RIDGE SERVICE AREA well
35. Mill Creek Ridge
MECHANICSVILLE SERVICE AREA well
36. Forsters Corner
DOYLESTOWN TOWNSHIP MUNICIPAL AUTHORITY well/surface
40. Cross Keys
NORTH PENN WATER AUTHORITY surface
17. Durham Village
BUCKINGHAM SPRINGS SERVICE AREA well/surface
33. Buckingham Springs
ROUTE 413
CARVERSVILLE RD
STREET RD
LONG LANE
INDIAN SPRINGS RD
LANDISVILLE ROAD
COLD SPRING CREAMERY ROAD
HASSELL ROAD
MECHANICSVILLE ROAD
ROUTE 113
ASH MILL RD
ASH ROAD
LOWER YORK RD
BYCROFT RD
HOLCOMB RD
UPPER MOUNTAIN RD
QUARRY RD
ANDERSON RD
BURNT HOUSE HILL RD
FELL ROAD
STONEY LANE
OLD FARM RD
BUSTON RD
CHURCH ROAD
CHURCH SCHOOL RD
MECHANICSVILLE ROAD
HALL RD
BARNES RD
SWAMP RD
DOYLESTOWN - BUCKINGHAM PIKE
ROUTE 202
SPRING VALLEY RD
FURLONG RD
MILL ROAD
OLD YORK RD
DURHAM RD
LOWER MOUNTAIN RD
UPPER MOUNTAIN RD
NEW HOPE RD
FOREST GROVE ROAD
FURLONG RD
OLD YORK RD
SUGAR BOTTOM ROAD
SWAMP ROAD
CREAMERY RD
FOREST GROVE RD
SMITH RD
DARK HOLLOW RD

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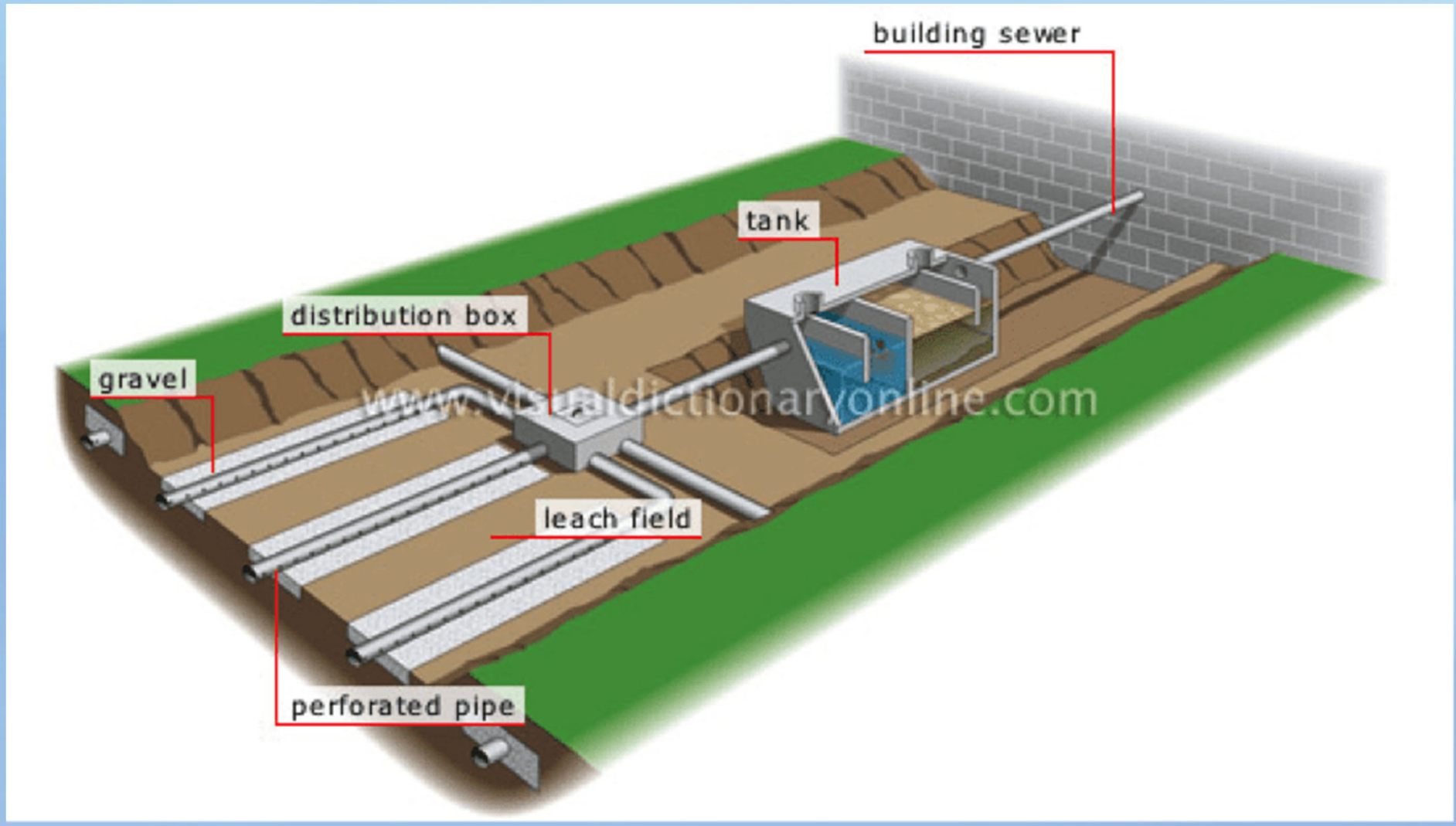
Cesspools

- Cesspools or cesspits are not intended to treat waste or wastewater from the home. These buried enclosures simply serve as a nearby storage location where the waste and wastewater are collected until a professional cesspool or septic pumping company can pump out the pit. The cesspool is essentially a sealed pit made of brick or concrete that is buried under the ground with a manhole for access.
- **New cesspools are illegal in all U.S. states, but some existing single-family residential cesspools may still be legal under state or local regula tions.**

Typical Residential Septic System

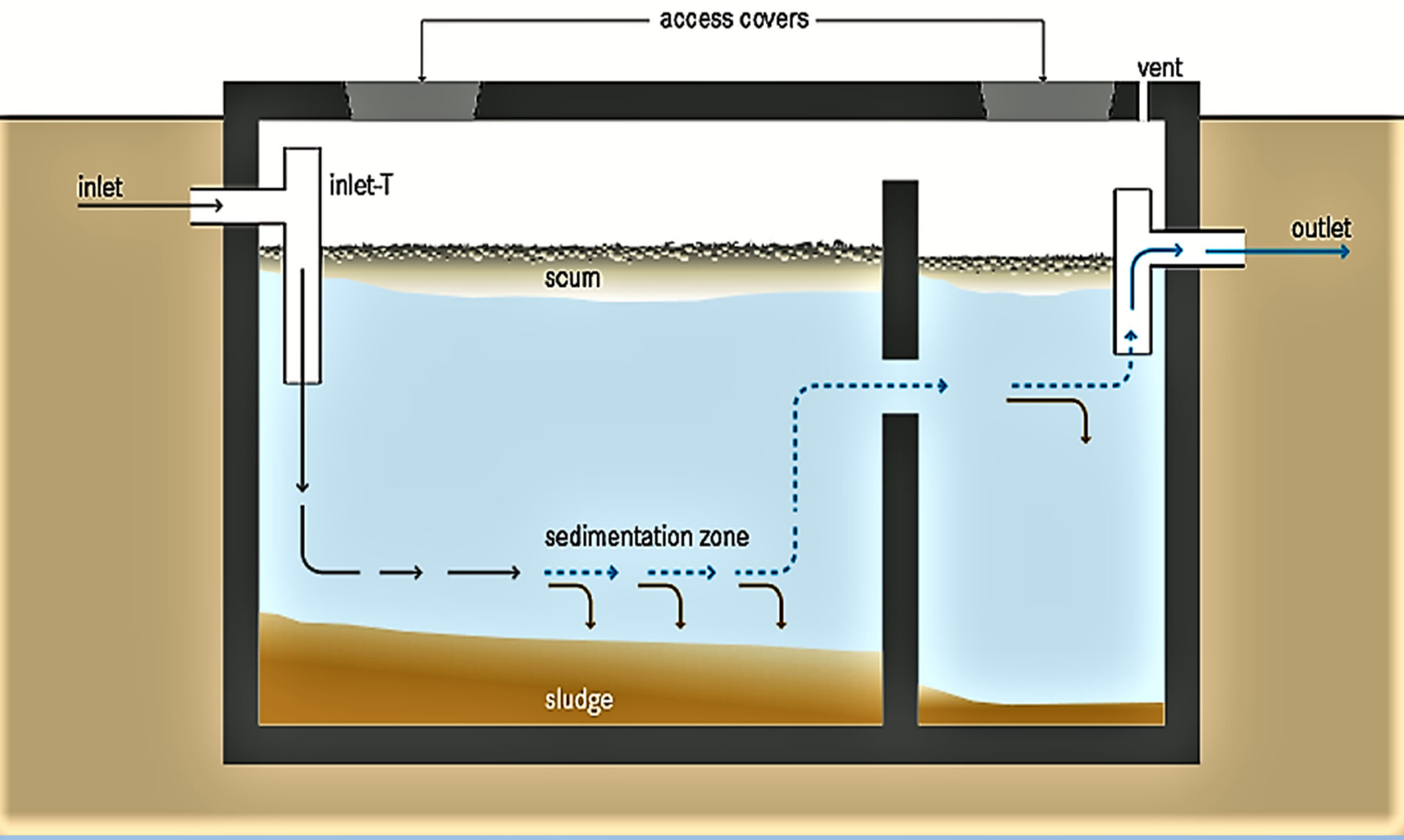


History of Private Septic Systems

- **1860**: Frenchman Jean-Louis Mouras invented the first septic tank to collect and treat wastewater.
- **1881**: Mouras was granted a patent for his septic tank design.
- **1883**: Septic systems started appearing in the US.
- **1940s**: Septic systems became cheaper and more popular during the post-WWII economic boom.
- **1960s**: Clean water act: Old septic systems began failing, and construction of sewage treatment plants couldn't keep up with urban growth.
- **1970's** The modern septic tank was developed. It includes Baffles and installations, removes solids, and makes it very easy to handle people's waste. Modern septic tanks come in different sizes and shapes and are made from different materials.
- **1990's** Two compartment tanks became a requirement. The tanks must have a solid baffle slot at mid-point and situated so that the inlet compartment held 2/3 of the liquid capacity.

Septic Tank Basics

- A septic tank is an underground system used to treat wastewater from homes and businesses that are not connected to a municipal sewer system.
- It consists of two main chambers: an inlet chamber where wastewater enters and an outlet chamber where partially treated effluent exits.
- The tank allows solids to settle at the bottom while allowing liquid effluent to flow out.
- Typically, septic tanks are designed to hold 2-3 days worth of wastewater. Usually, they hold about 1000 gallons.


access covers
vent
inlet
inlet-T
outlet
scum
sedimentation zone
sludge

Septic tank-Degradation Process:

- When solid waste (such as organic matter, toilet paper, and other debris) enters the septic tank, it settles at the bottom.
- Bacteria and other microorganisms in the tank release enzymes that break down the organic solids through a process called **anaerobic digestion**.
- Anaerobic digestion occurs in the absence of oxygen, and it helps break down complex organic compounds into simpler substances.
- Over time, the solid waste gradually decomposes into sludge, which remains in the tank.

Anaerobic digestion

- Anaerobic digestion, releases gases, such as methane and ammonia, which are vented out of the septic system and degrades insoluble solids into water soluble substances.
- Over time, the solid waste gradually decomposes into sludge, which remains in the tank.
- Decomposition of the solids is incomplete (50-60%) so the tank must be pumped periodically
- The remaining liquid, or effluent, exits the tank and enters the drain field for further treatment.

Is it degraded in a Septic Tank ?

Material	No/poorly	Fair	Good
Plastic, Baby Wipes, Diapers, Condoms, Cigarette butts, Dental Floss…	★		
Metals, Solvents, Paint, Gasoline, Motor oil, Grease, cleaning chemicals.	★		
Sand , Soil, Cat litter, Potting media, Coffee Ground	★		
PFAS, Pesticides, Microplastics			
Pharmaceuticals, Antibiotics, Triclosan, Estrogen, Arsenic, Lead			
Paper, Cardboard , Cellulose, Toilet Paper			
Urea, Human Waste, Nitrogen, Phosphate			
Fats, Oils , Greases, Soaps, Detergents	★		
Pathogens, virus			
Sugars, Proteins, Amino Acids,			
Total Suspended Solids			

A good septic tank effluent concentration typically falls within the following ranges

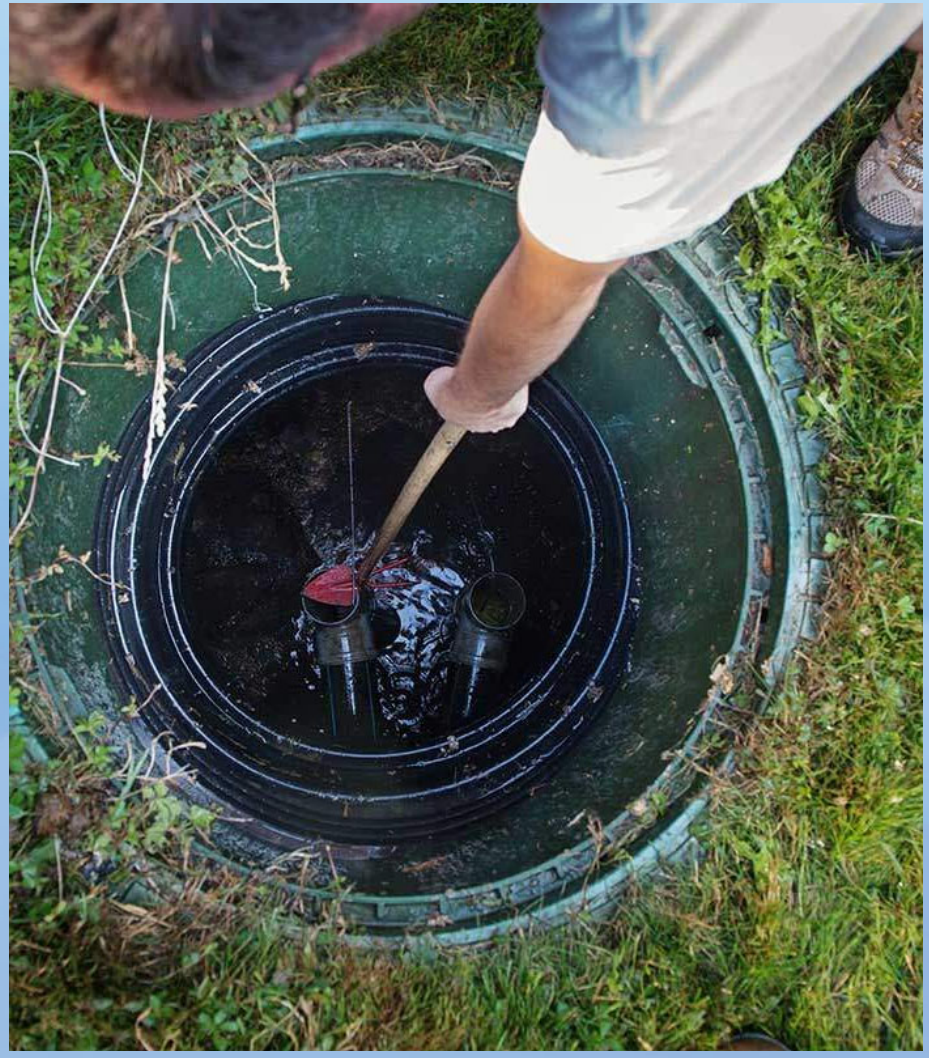
Biochemical Oxygen Demand (BOD): 150 to 250 mg/L- Biochemical oxygen demand (BOD) represents the amount of oxygen consumed by bacteria and other microorganisms while they decompose organic matter under aerobic (oxygen is present) conditions . **EPA requires discharge into a stream to have a BOD<0.2 mg/l**

Total Suspended Solids (TSS): 40 to 140 mg/L **(EPA-requires - 0.03-0.1mg/L)**

Fats, Oils, and Greases (FOG): 20 to 50 mg/L[1] **(EPA requires -0.1 mg/L)**

Septic Tank Solids

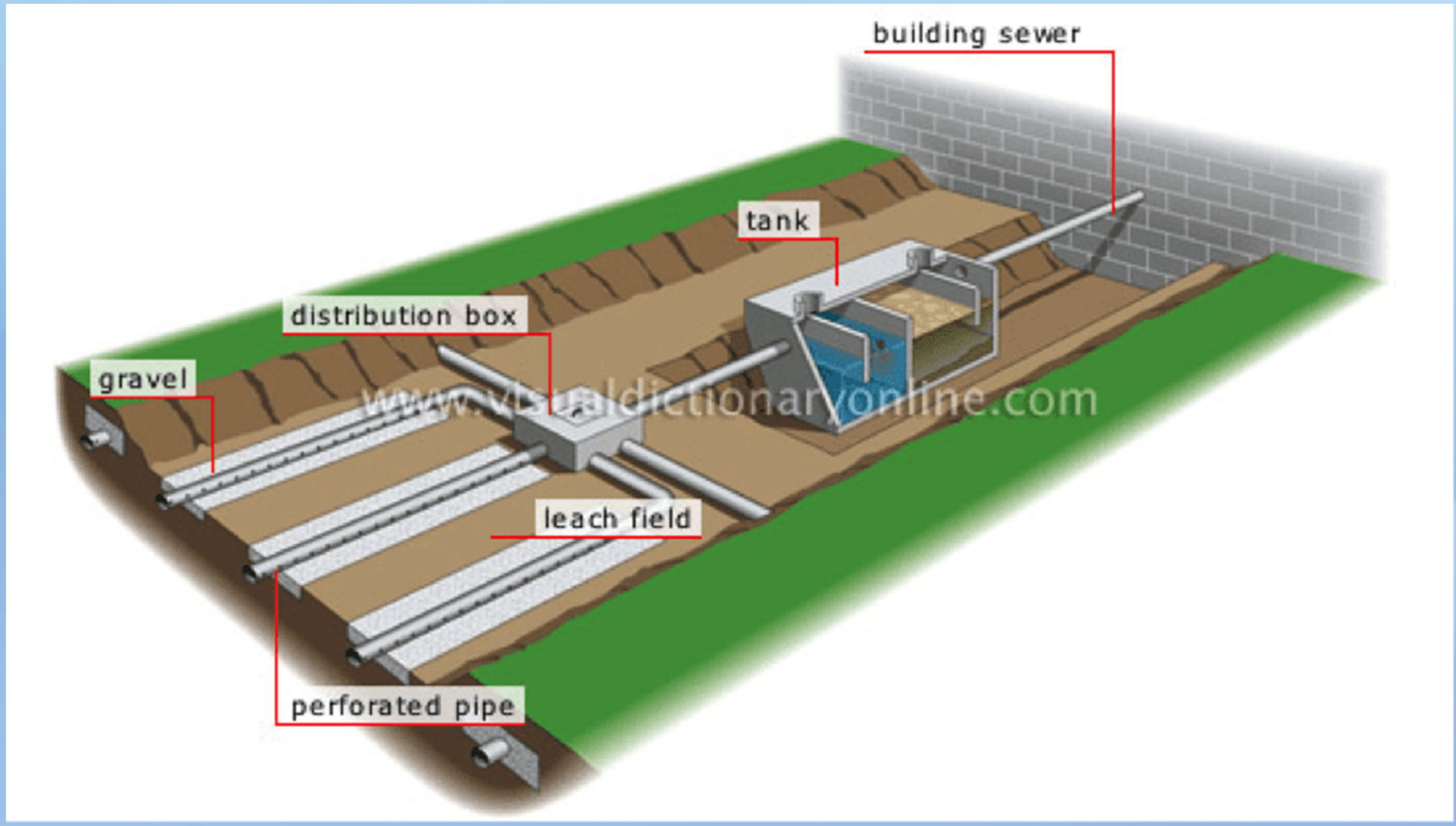
- Septic tank solids refer to the organic matter that accumulates in the septic tank over time. These solids include sludge, which is the heavier, settled material, and scum, which is the lighter, floating material.
- Sludge consists of partially decomposed organic matter and other solids, while scum is composed of oils, fats, and other substances that float on top of the wastewater.
- If these solids are not properly broken down and removed, they can cause blockages, backups, and other septic system problems.



Pumping and Maintenance

- Regular maintenance is essential to keep the septic system functioning properly.
- Pumping removes the accumulated solids, preventing them from clogging the system or overflowing into the drain field.
- Homeowners should pump their septic tanks every 2-5 years (3 years is a good rule of thumb).

Typical residential Septic System



The Leach Field

- The leach field plays a crucial role in the final treatment of effluent.
- Effluent from the septic tank is distributed to a series of perforated pipes surrounded by gravel.
- The liquid percolates through the soil, where microbes degrade organic substances and the soil filters out the microbes.
- This is an aerobic degradation
- Avoid parking vehicles or driving heavy objects over the drain field, as this can compact the soil and impede the flow of wastewater.

The leach field

The leach field

The leach field is critical to filtering out and degrading

- Pathogens and viruses
- Alcohols, acids, lipids and soaps not degraded in the septic tank
- Urea and nitrogen containing compounds
- Phosphate
- Some pharmaceuticals, pesticides and solvents

Is it degraded in a Leach Field?

Material	No/poorly	Fair	Good
PFAS,			
Pharmaceuticals, Antibiotics, Triclosan, Estrogen, Pesticides , Solvents, Microplastics			
Heavy Metals- Arsenic, Lead, Salt			
Urea, Human Waste,			
Fats, Oils , Greases, Soaps, Detergents		`	
Pathogens, virus			
Sugars, Proteins, Amino Acids,			
Total Suspended Solids			

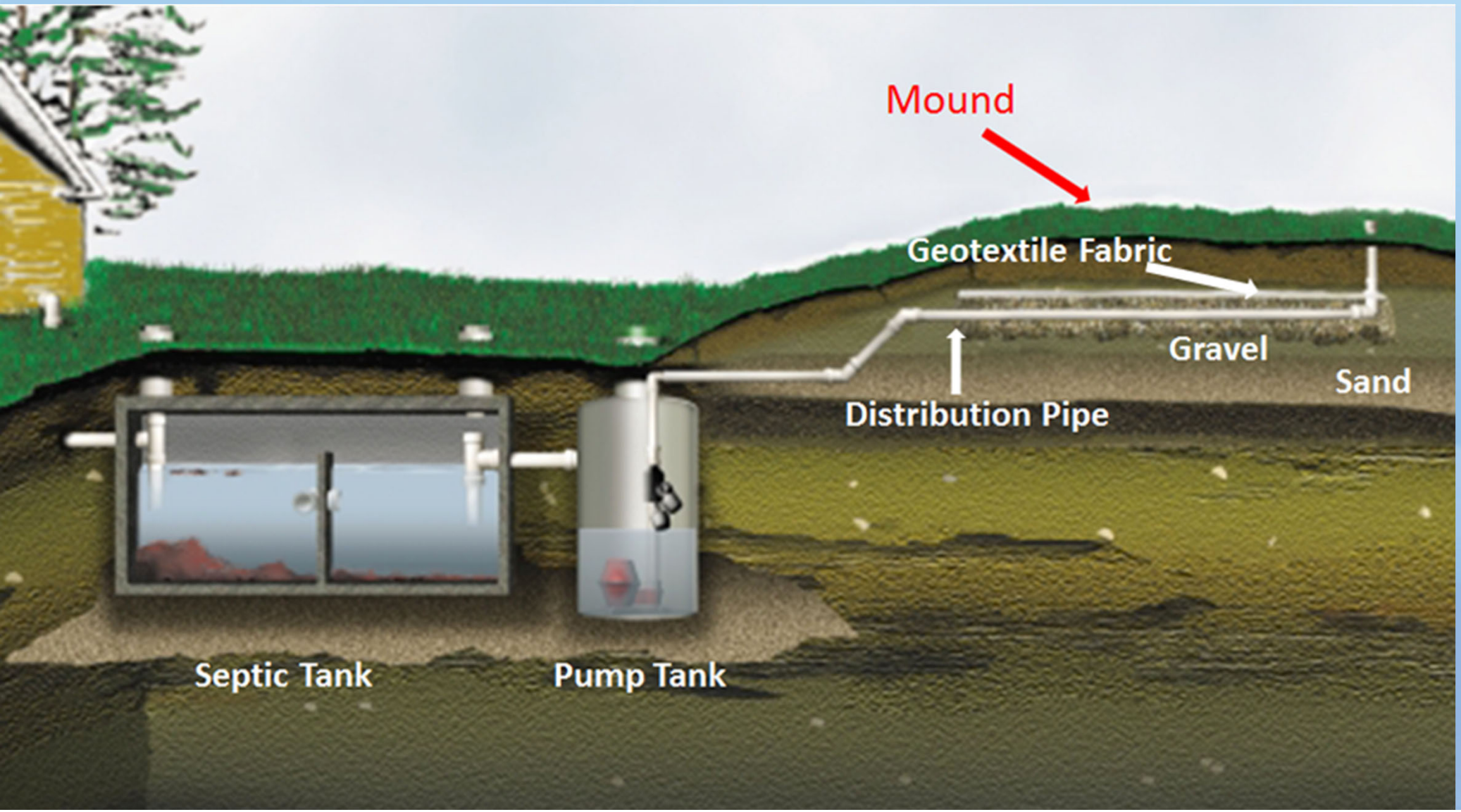
The leach field

- To work effectively a leach field requires soils that
  - Allow water to infiltrate fast enough to accommodate the waste flow
  - Do not short circuit to streams
  - Do not flood
- If soils do not provide this engineering systems can help.

Sand Mounds

- **Sand mounds**, also known as **mound septic systems**, are an alternative type of septic system designed to address specific environmental or soil conditions where conventional septic systems may not be suitable
  - Shallow soil depth
  - Poor soil structure
  - High groundwater or water table
  - Shallow bedrock close to the surface
- Unlike conventional systems, where the drain field relies on gravity, mound systems use a pump to distribute effluent.

Sand Mounds


Mound
Geotextile Fabric
Gravel
Sand
Distribution Pipe
Septic Tank
Pump Tank

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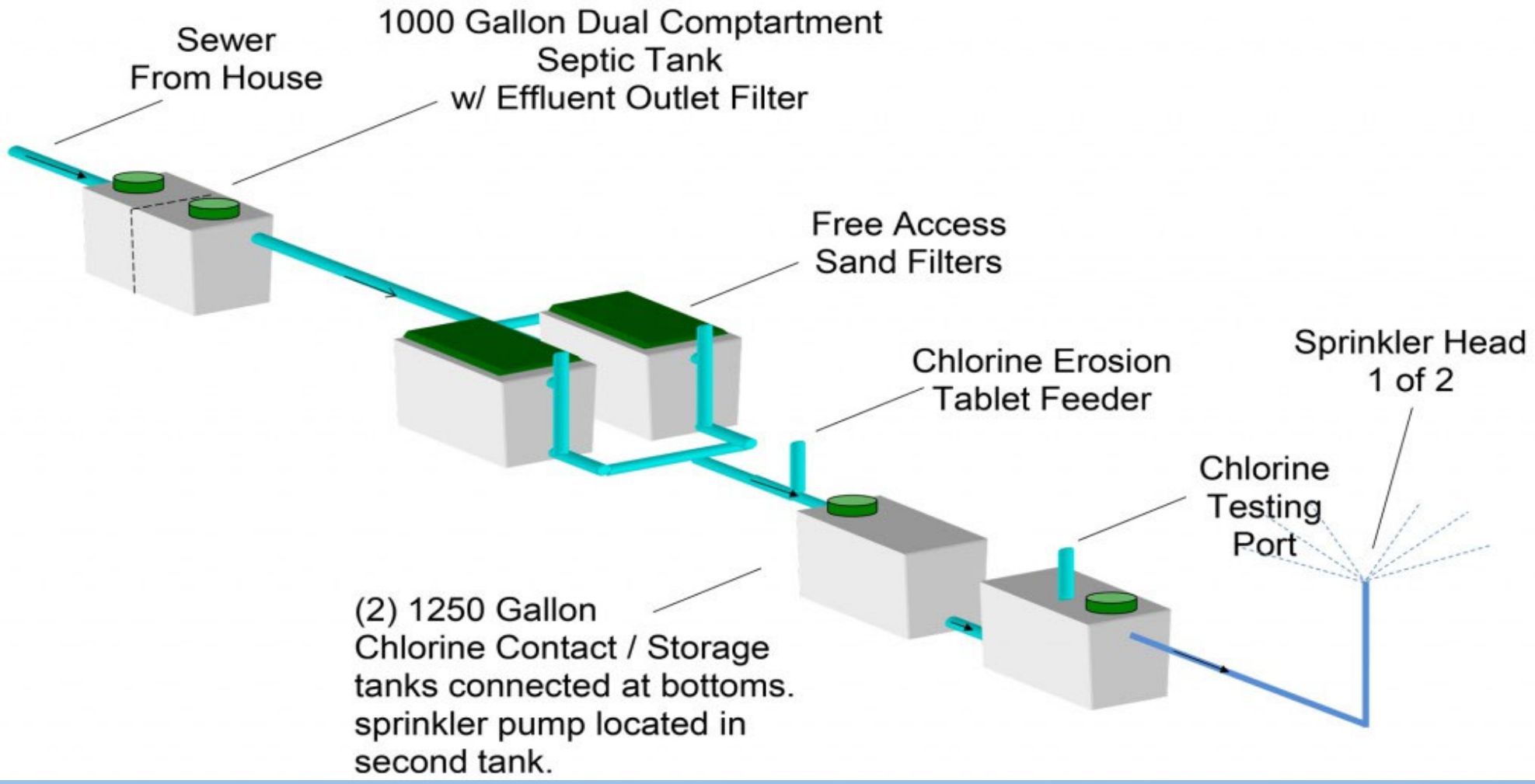
Residential Spray fields- Green filters

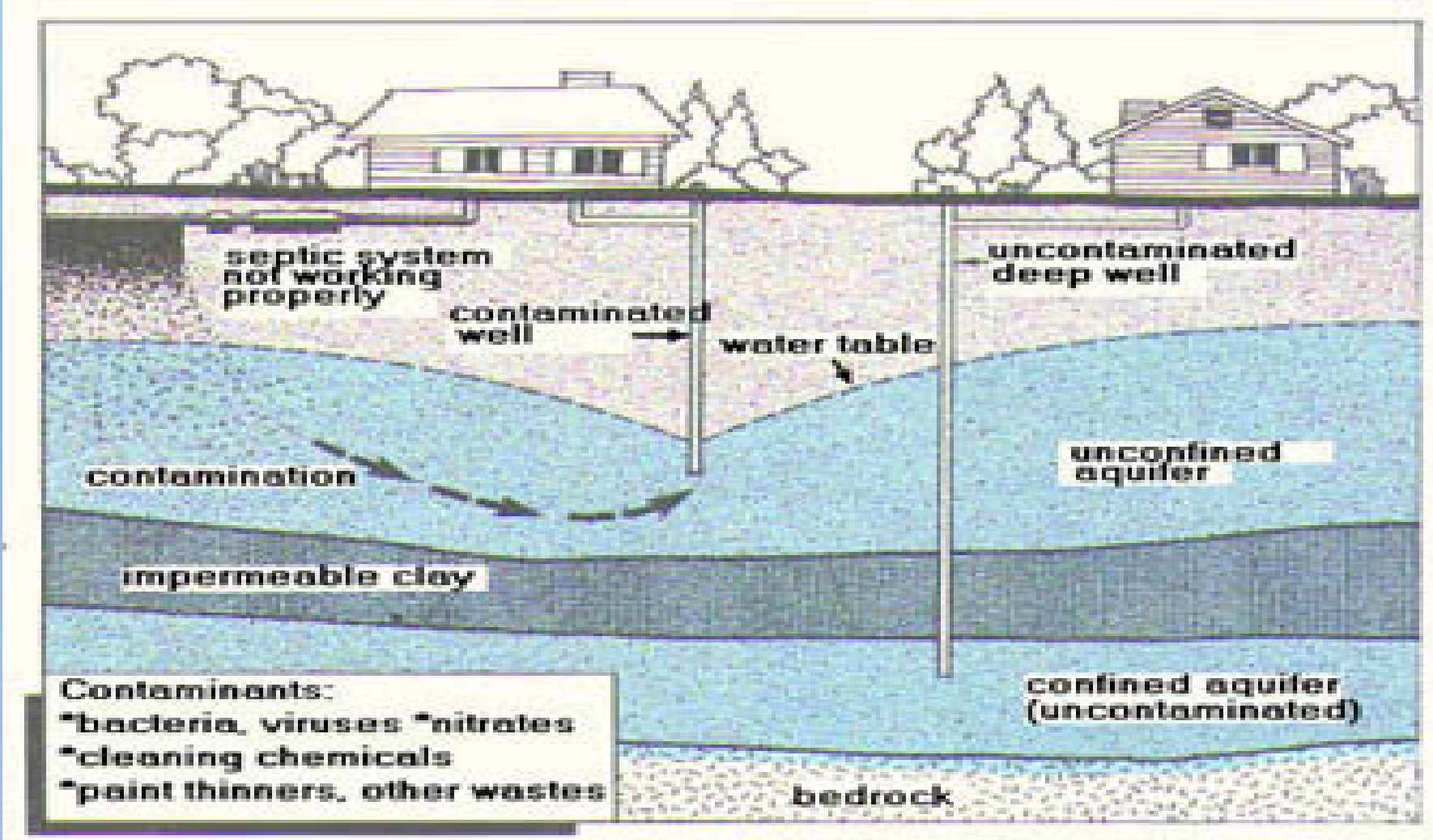
- Residential spray fields are a viable and environmentally friendly option for sewage treatment in Pa. These fields are designed to treat and dispose of sewage using a system of piping, treatments tanks, phytoremediation and soil renovation
- Need a lot of space

Individual Residential Spray Irrigation System

Requires a minimum of 10 inches to limiting zone.



Leach fields can contaminate Ground Water and Surrounding Wells



What happens when Septic Systems Fail

- **Overloading**: If the drain field is overloaded or clogged, it can cause sewage to surface or back up into your home.
- **Saturation**: High water tables can saturate the drain field.
- **Leakage**: Poorly designed or maintained systems can lead to wastewater leakage and contamination of nearby groundwater sources.
- **Contamination**: Septic systems can contaminate groundwater with bacteria, viruses, nitrates, detergents, oils, and chemicals.

How to Maintain a Septic System

- Pump the tank and inspect every 2-5 years
- Use water efficiently (stop leaks and drips)
- Do not put baby wipes, condoms, diapers, plastic bags, coffee grounds, kitty litter, oil, grease, gasoline, Paint and non-organic material down the drain.
- Do not put harsh chemicals, which will kill bacteria, down the drain
- Do not park cars or plant trees/shrubs over drain fields
- Do not grow plants with deep root systems in the drain field

Things to watch out for if you have a Septic System

- Slow drains
- Gurgling Noises
- Mushy Soil/Standing water in drain field
- Septic odors

Septic System Analysis

- Strengths
  - Independent of central systems
  - Recharge aquifer
  - Remove most organic wastes, N, Ph
  - Removes pathogens
  - Inexpensive to operate
- Weaknesses
  - Not Monitored continuously
  - Do not remove Salts, Metals and complex organic wastes
  - Do not benefit from Phytoremediation
  - Can contaminate Aquifers/Wells
  - Need periodic pumping
  - Expensive to repair

Thank You !

Join us for part 2-Stormwater

- January 24th 1-3PM