

Onsite Wastewater System Basics

Dr. Jason R. Barrett

Associate Extension Professor

Associate Director

Mississippi Water Resources Research Institute

Onsite Wastewater Treatment

- What is an On Site Sewage Facility (OSSF)?
- Why are we concerned about wastewater?
- Evolution of onsite wastewater treatment
- Function of a septic system
- Evaluation of septic tank operation
- When should a septic tank should be pumped?
- How to live with a septic system



Onsite Wastewater Treatment

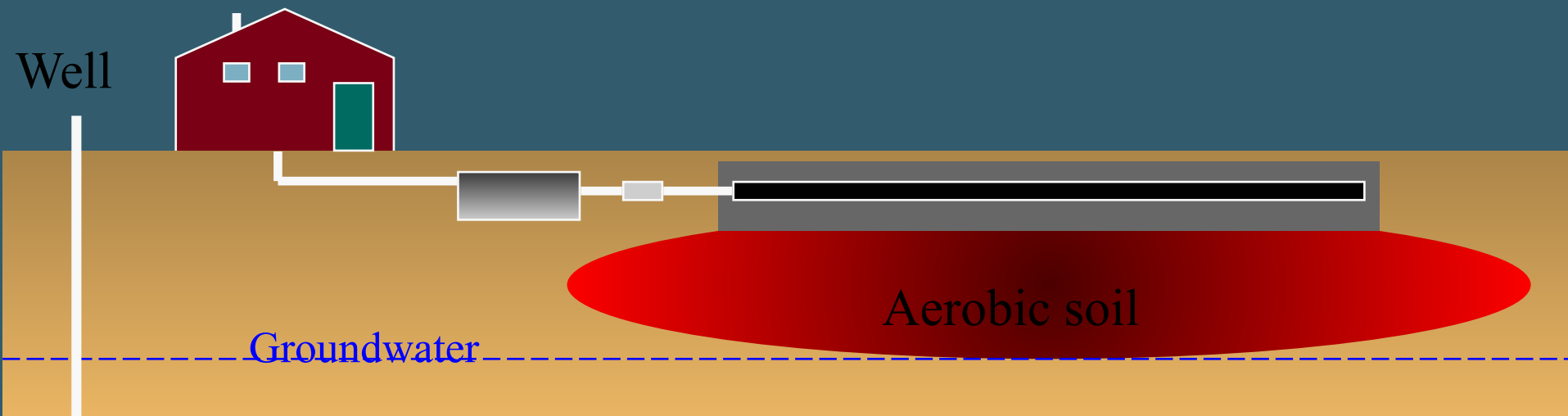


Malfunctioning Onsite System

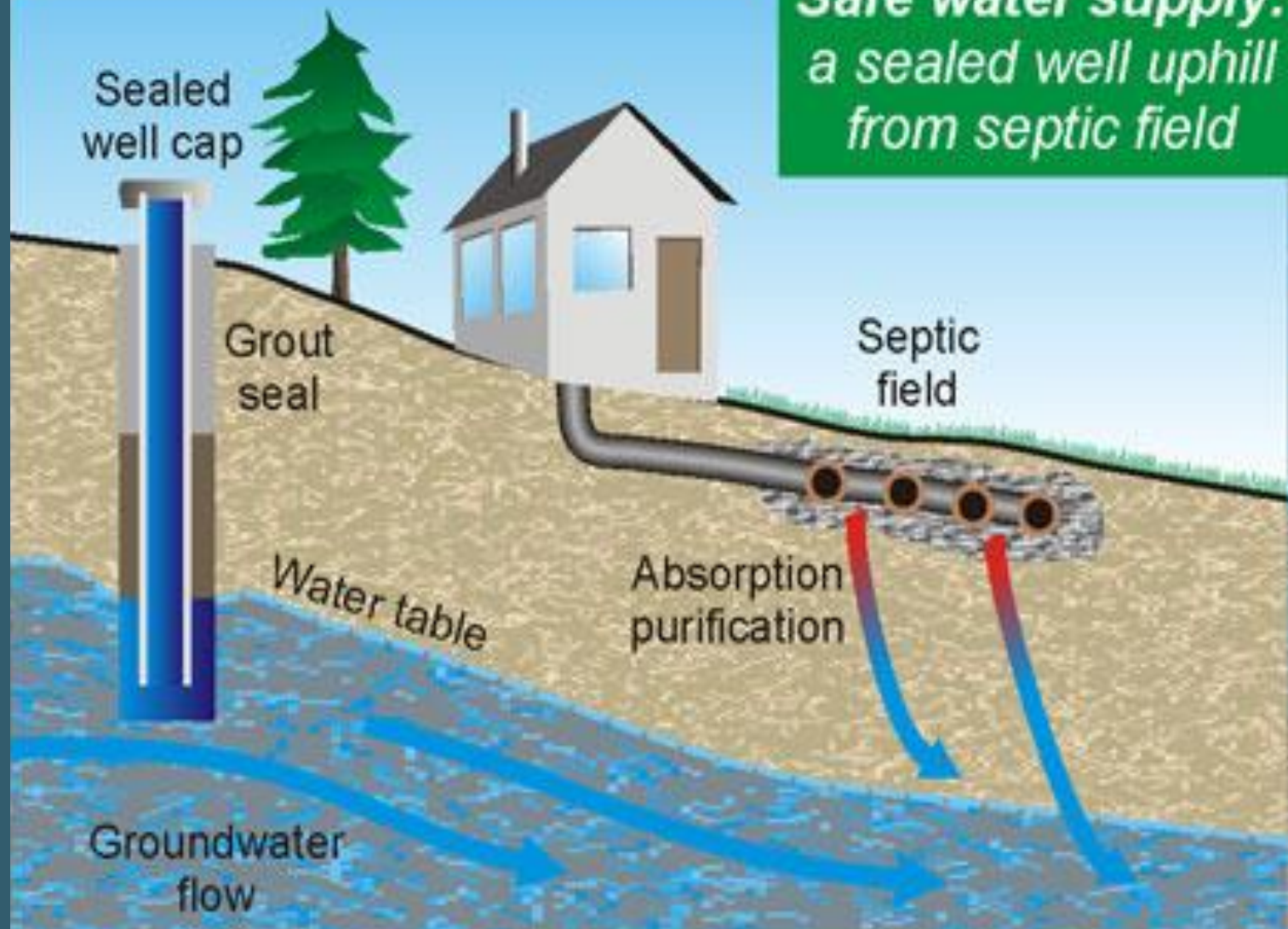


Evolution of Wastewater Management

- Evolving goal:
 - Disposal: effluent goes away versus treatment
 - Dispersal: TREATMENT
- Public health AND environmental issues addressed
- Management:
 - Disposal: often no management at all
 - Dispersal: system management is critical



**Safe water supply:
a sealed well uphill
from septic field**



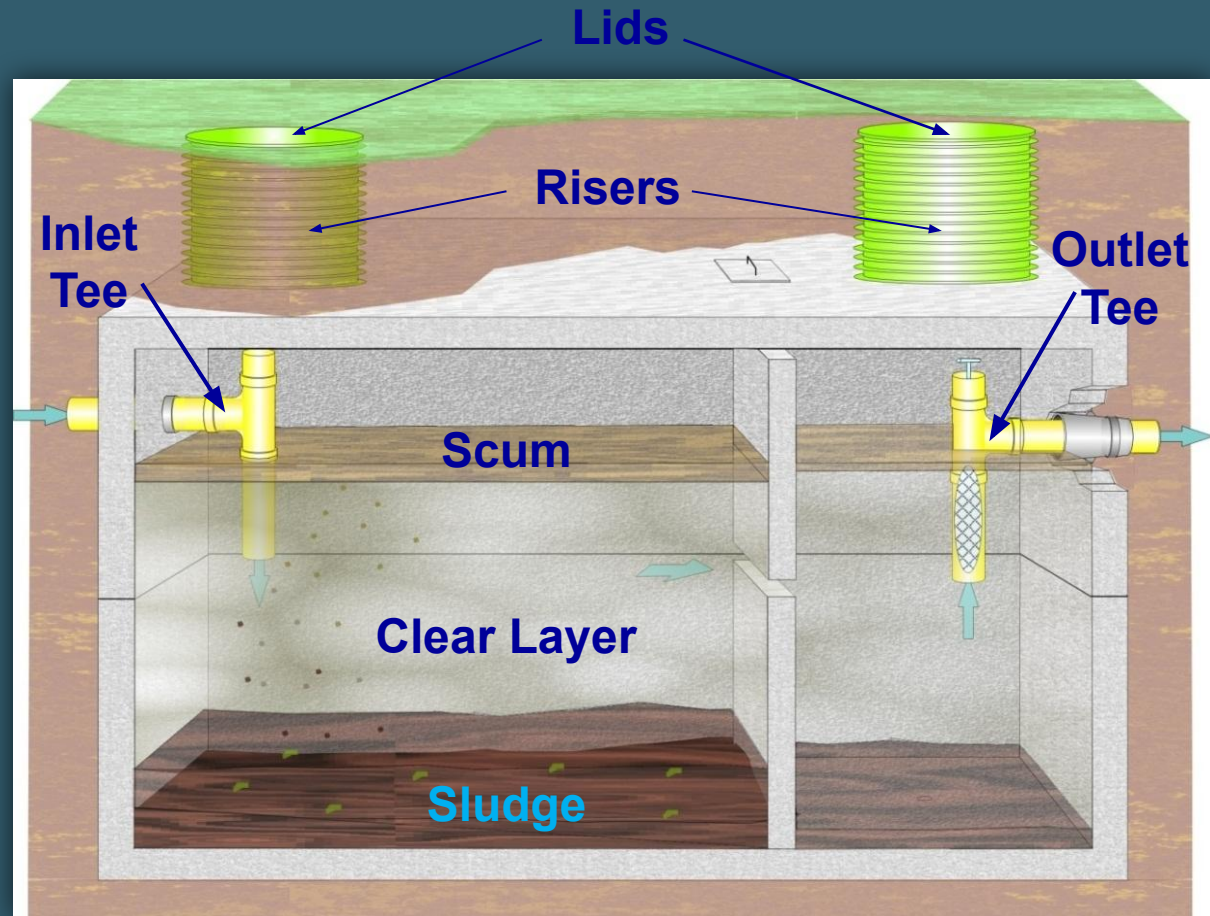
How do we make the OSSF work?



- Evaluate the wastewater source:
 - Hydraulic and organic loading
- Evaluate site
 - Wastewater treatment
 - Wastewater acceptance
- Choose a final treatment and dispersal component
- Choose the appropriate pretreatment system
- Operation and maintenance

What is a Septic Tank?

- Water tight containers
 - Concrete
 - Plastic / Fiberglass
 - NOT Metal
- Detention time
 - Typically 2-3 days
 - Calm conditions
- Gravity separation
 - Heavy sinks
 - Lighter floats
- Anaerobic digestion



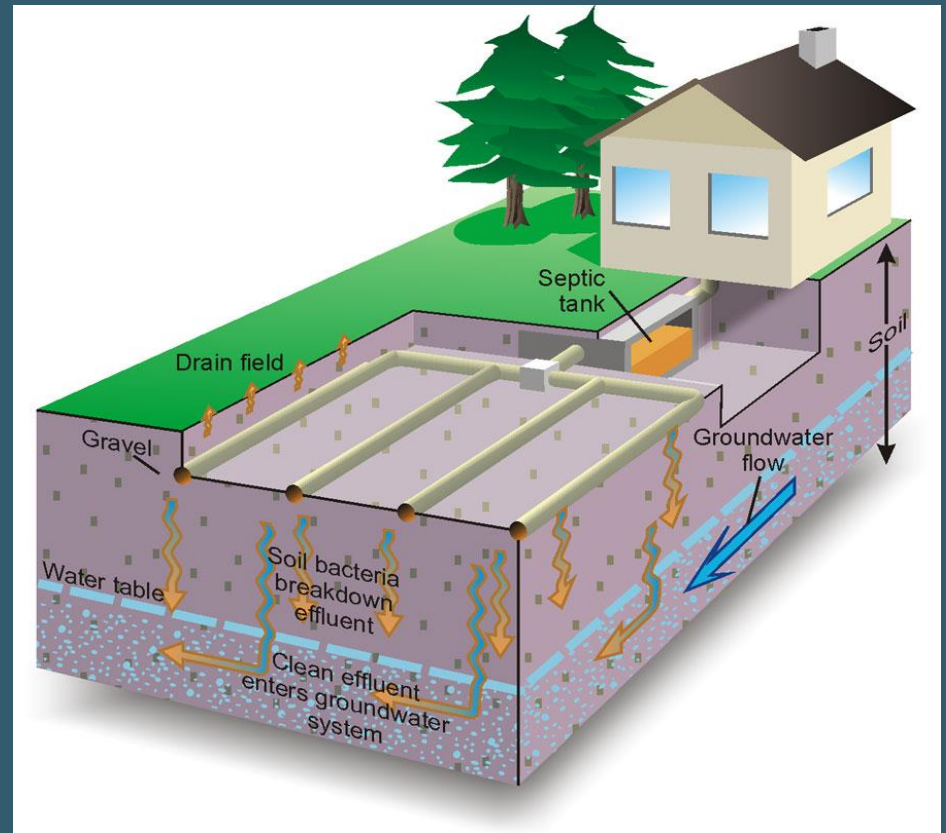
SEPTIC TANK

- *Compartmented tank or series of tanks*
 - *Concrete, fiberglass, polyethylene*
- *Primary treatment – solids separation*



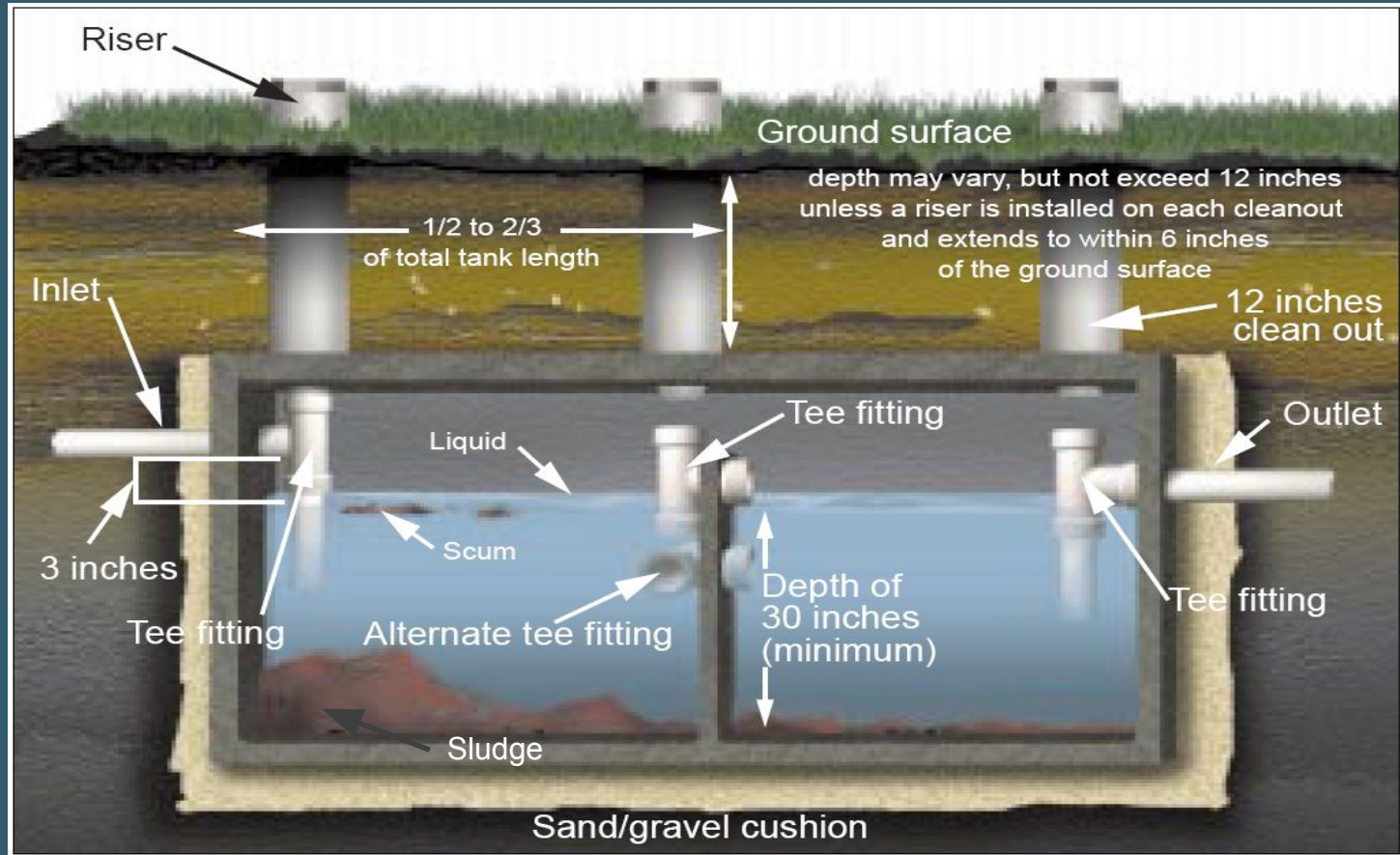
TYPICAL SYSTEM COMPONENTS

- *Household Collection System*
- *Septic Tank*
- *Effluent Distribution*
 - *Distribution Box*
 - *Pump/Dosing System*
- *Drainfield/ Absorption System/ Soil Treatment Area*
- *Replacement Area*



http://geoscape.nrcan.gc.ca/h2o/bowen/quality_e.php

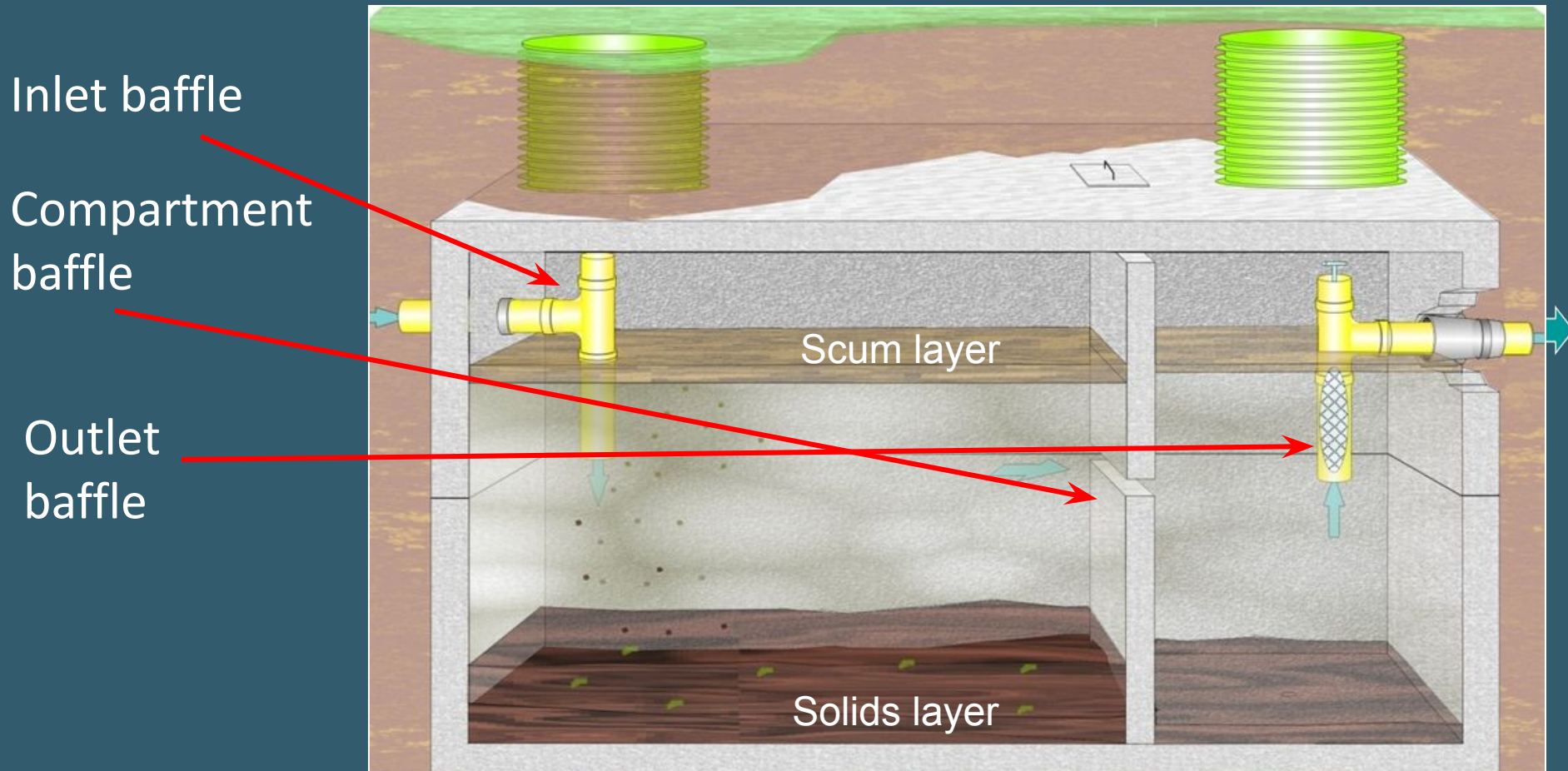
TWO COMPARTMENT SEPTIC TANK



Lesikar, 1999; On-site wastewater treatment systems, L-5234

Baffles

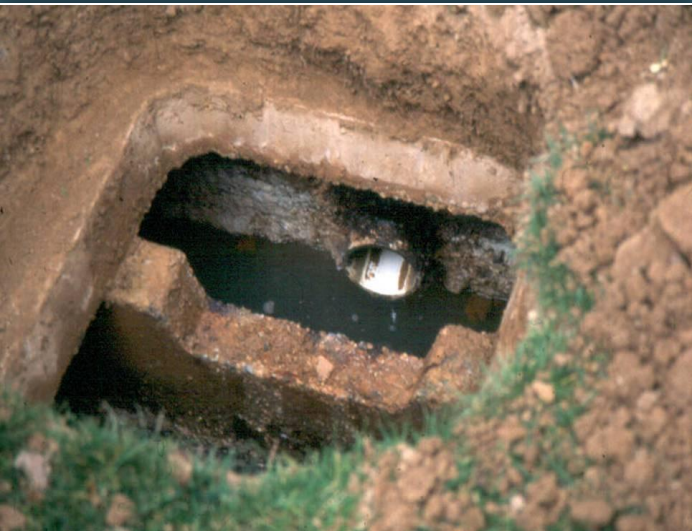
- Critical to retention of solids in the septic tank
- Determine if baffles are in place



Baffles



- Concrete
- Plastic
- Fiberglass
- PVC tee



Effluent Screens

- Installed at the septic tank outlet
- Trap solids trying to leave the septic tank
- Protect the drainfield
- Screen is washed off directly into the inlet side of the septic tank

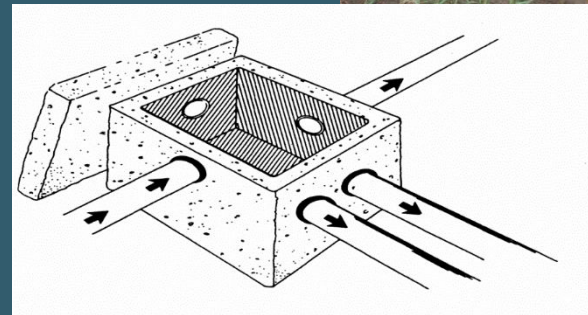


Tank Structural Condition

- Watertight (no visual leaks)
- Rebar exposed
- Root intrusion
- Corrosion or spalling present
- Cracks or Flex



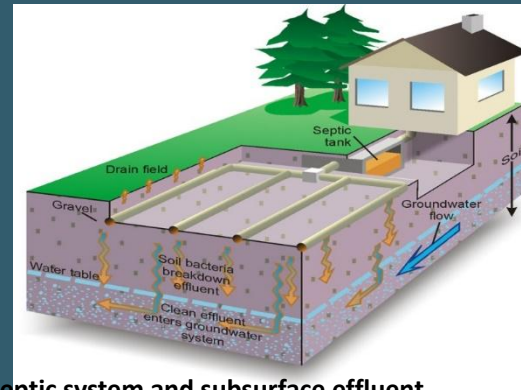
DISTRIBUTION BOX



LATERALS



Installing distribution laterals

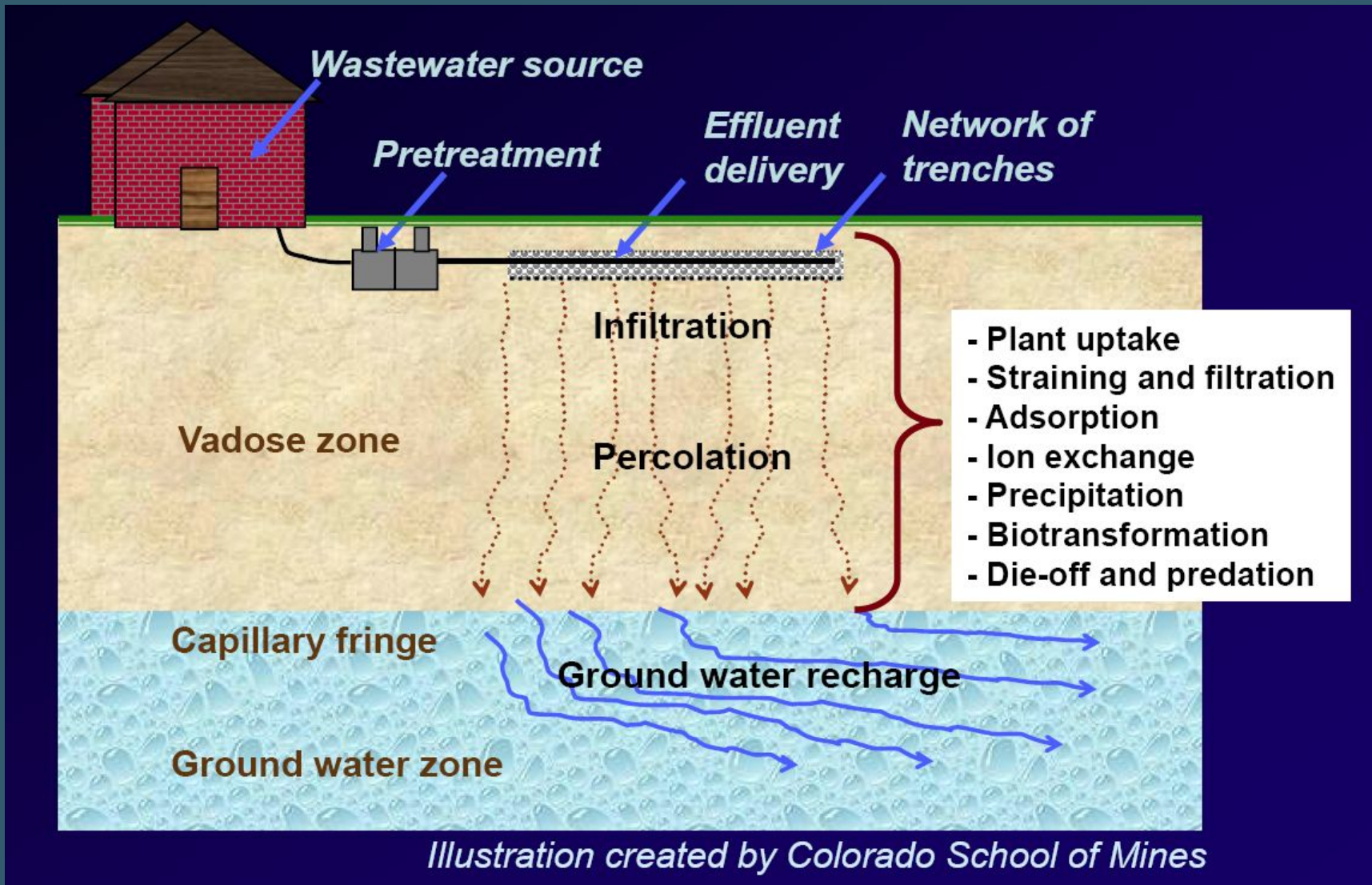


Septic system and subsurface effluent movement



Installing lateral in gravel filled trench

HOW DOES A SEPTIC SYSTEM WORK?



What is a Septic Tank?

The diagram illustrates the flow of wastewater from a house through a septic system. It is divided into two main sections: 'Conventional Septic System Pretreatment' and 'Final Treatment and Dispersal'. The 'Conventional Septic System Pretreatment' section shows a two-chambered tank with a float valve and a pump. The 'Final Treatment and Dispersal' section shows a long, perforated pipe that disperses treated effluent into the ground. A control panel at the bottom right allows the user to 'Run the Water' and toggle between 'Conventional System' and 'Aerobic System'.

HOW A SEPTIC SYSTEM WORKS

AgriLIFE EXTENSION
Texas A&M System
For More info

To House

Conventional Septic System Pretreatment

In the pretreatment portion of a septic system, many of the contaminants are removed from the wastewater in order to prepare it for final treatment and discharging into the environment. Contaminants in the wastewater include harmful bacteria that can cause illness, as well as nitrogen and phosphorus that can stimulate algae growth in water bodies.

Run the Water

Conventional System **Aerobic System**

Final Treatment and Dispersal

Septic System Pretreatment

What is a Septic Tank?

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Turn off water

Conventional System

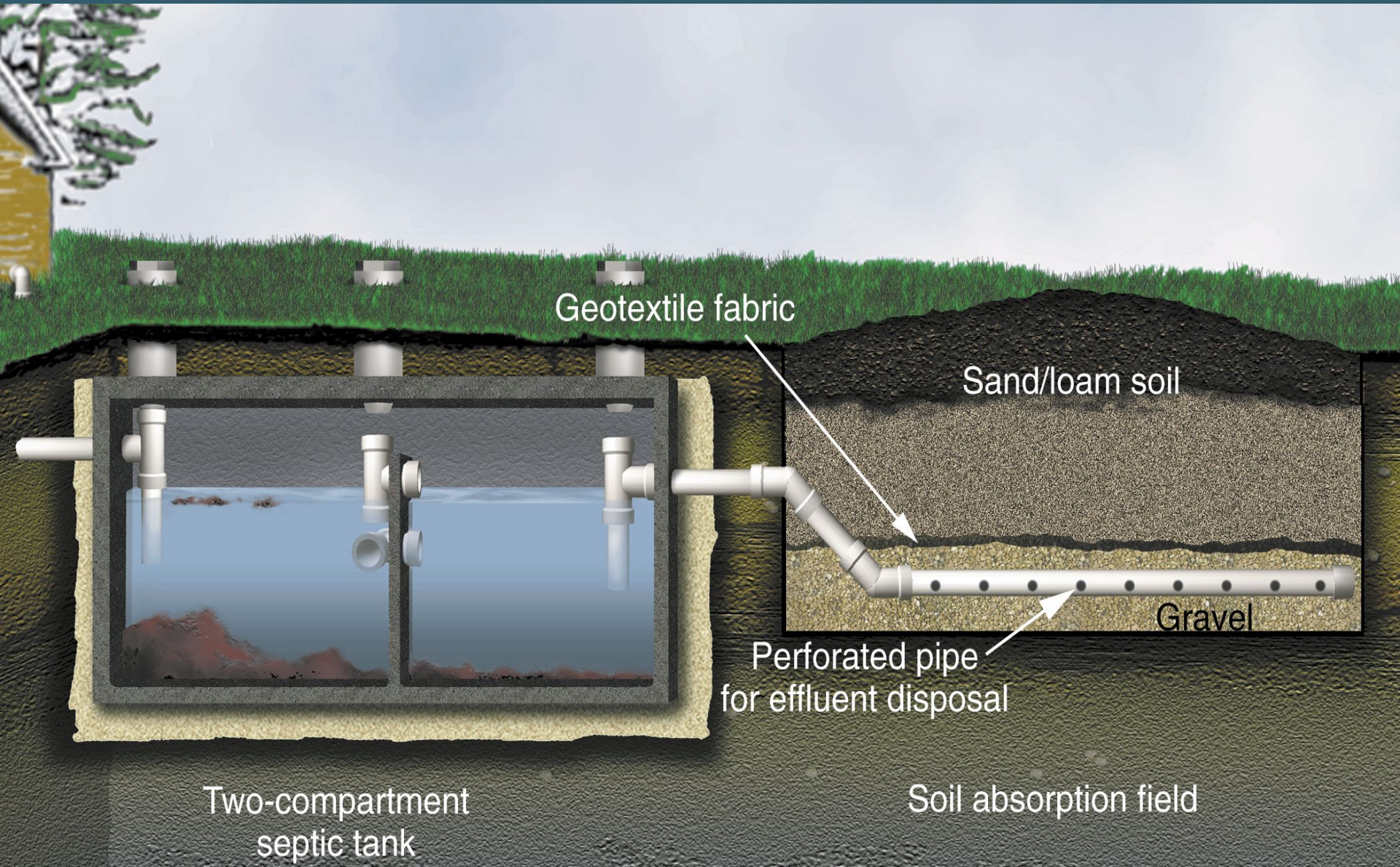
Aerobic System

Septic System Pretreatment

Final Treatment and Dispersal

The infographic illustrates a cross-section of a septic system. On the left, a house is shown with a pipe leading to a large rectangular tank labeled 'Septic System Pretreatment'. This tank is divided into two chambers. The left chamber contains a float valve and a pump. The right chamber contains a float valve and a pump. A pipe leads from the right chamber to a dispersal pipe that runs horizontally through the ground, labeled 'Final Treatment and Dispersal'. The dispersal pipe has several small circular openings along its length. The ground is shown in cross-section, with a green lawn on top and brown soil below. The sky is blue with white clouds.

Conventional Septic Tank System

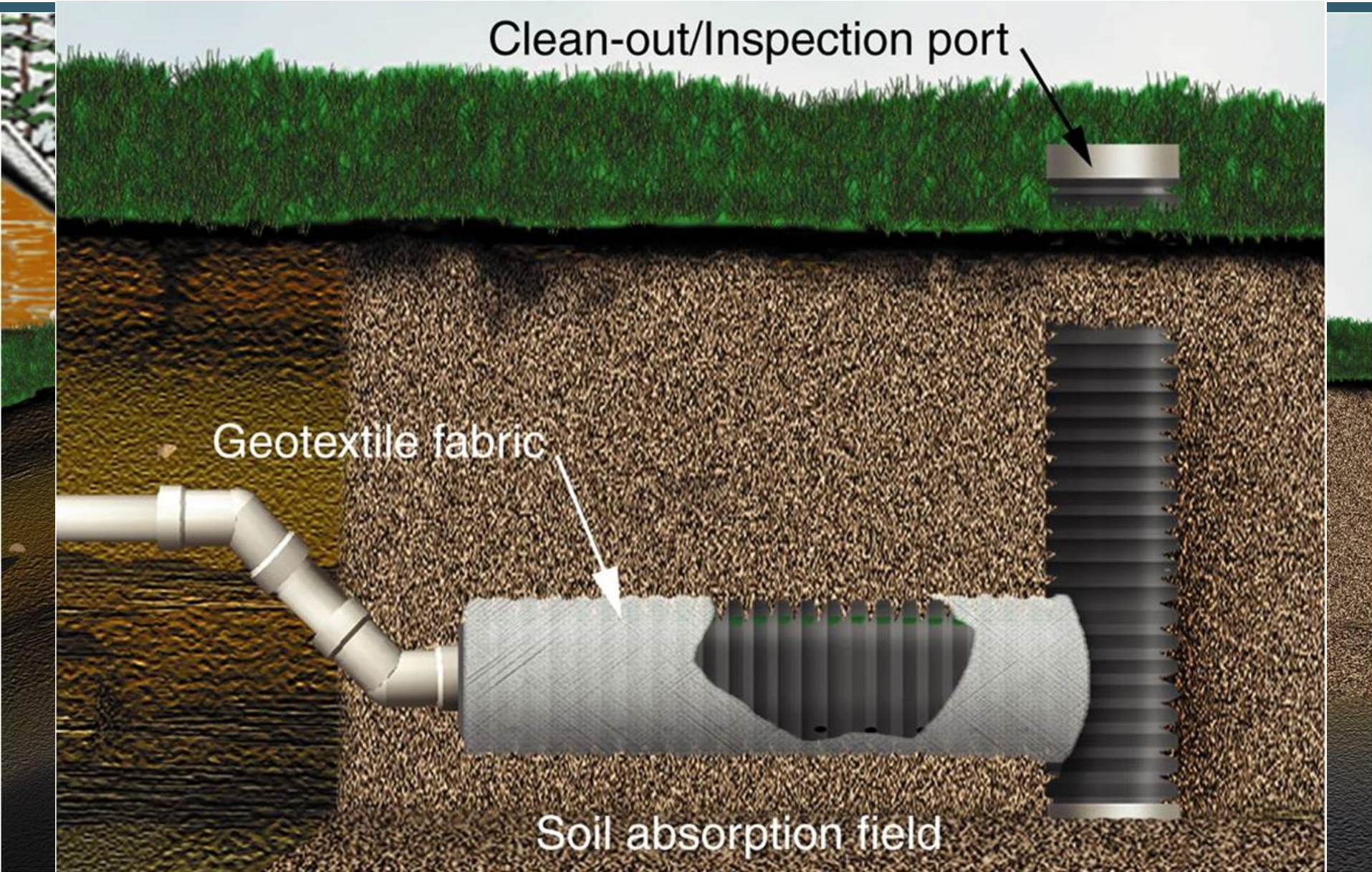


Gravel-less Pipe Distribution

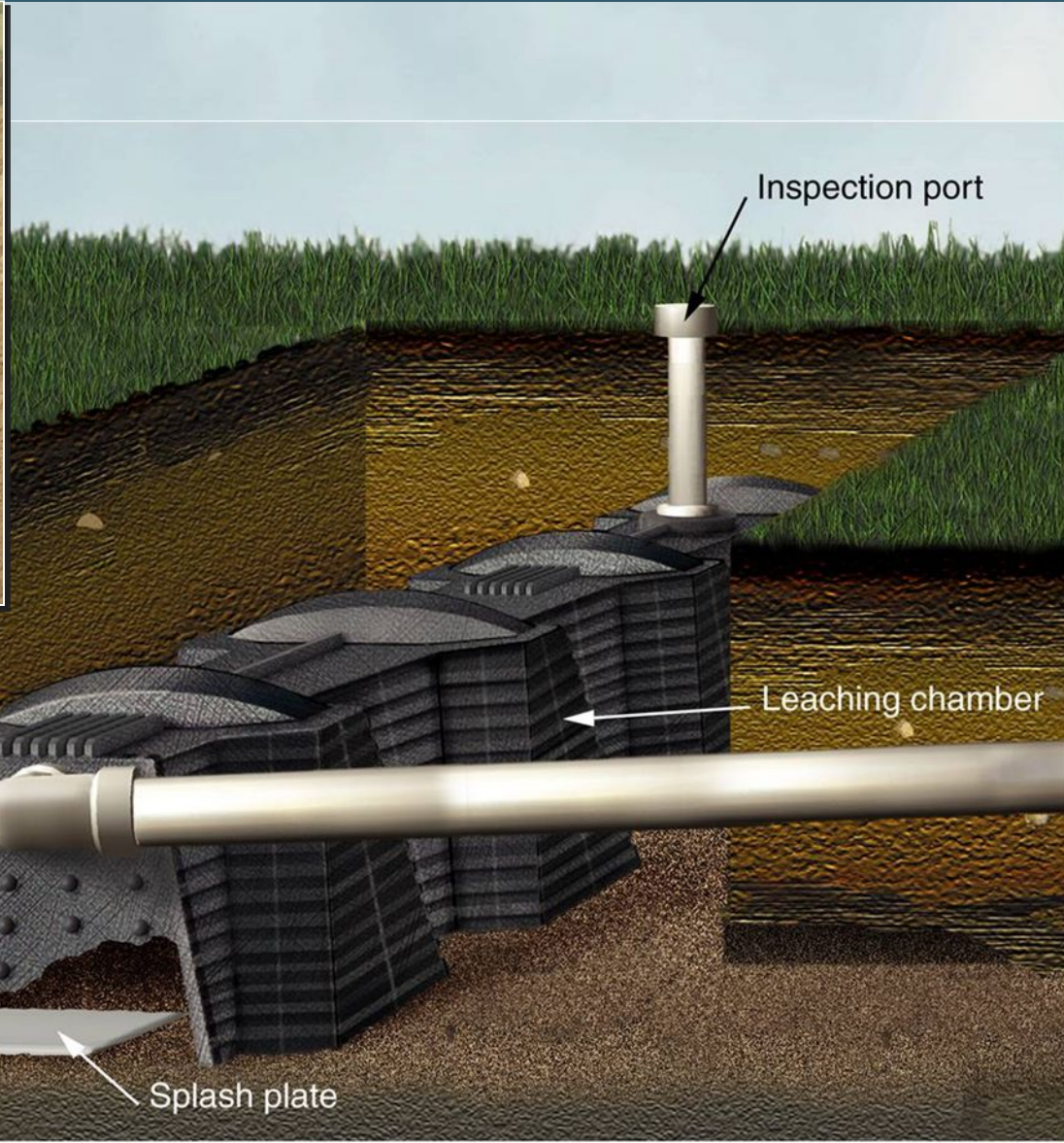
Clean-out/Inspection port

Geotextile fabric

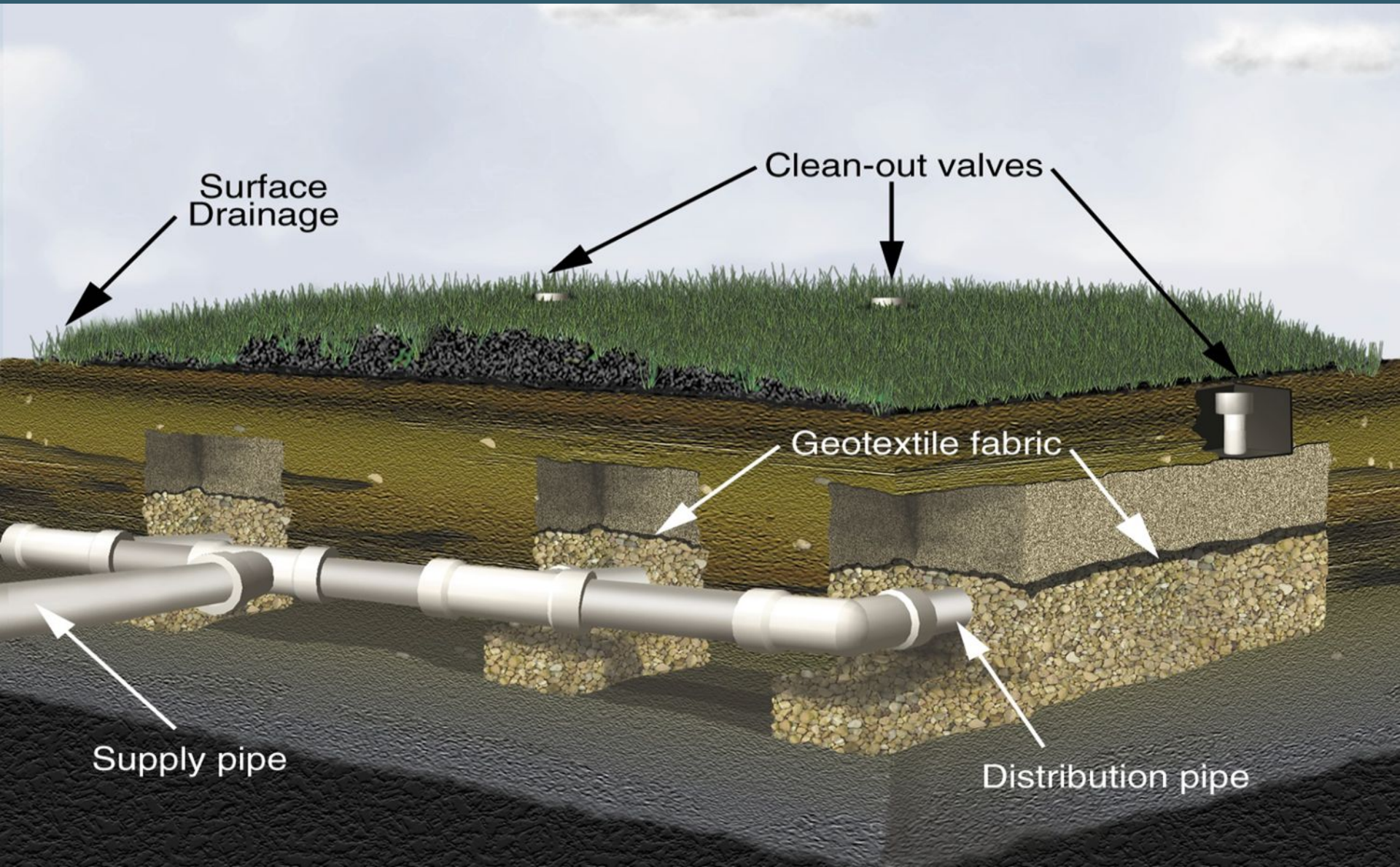
Soil absorption field



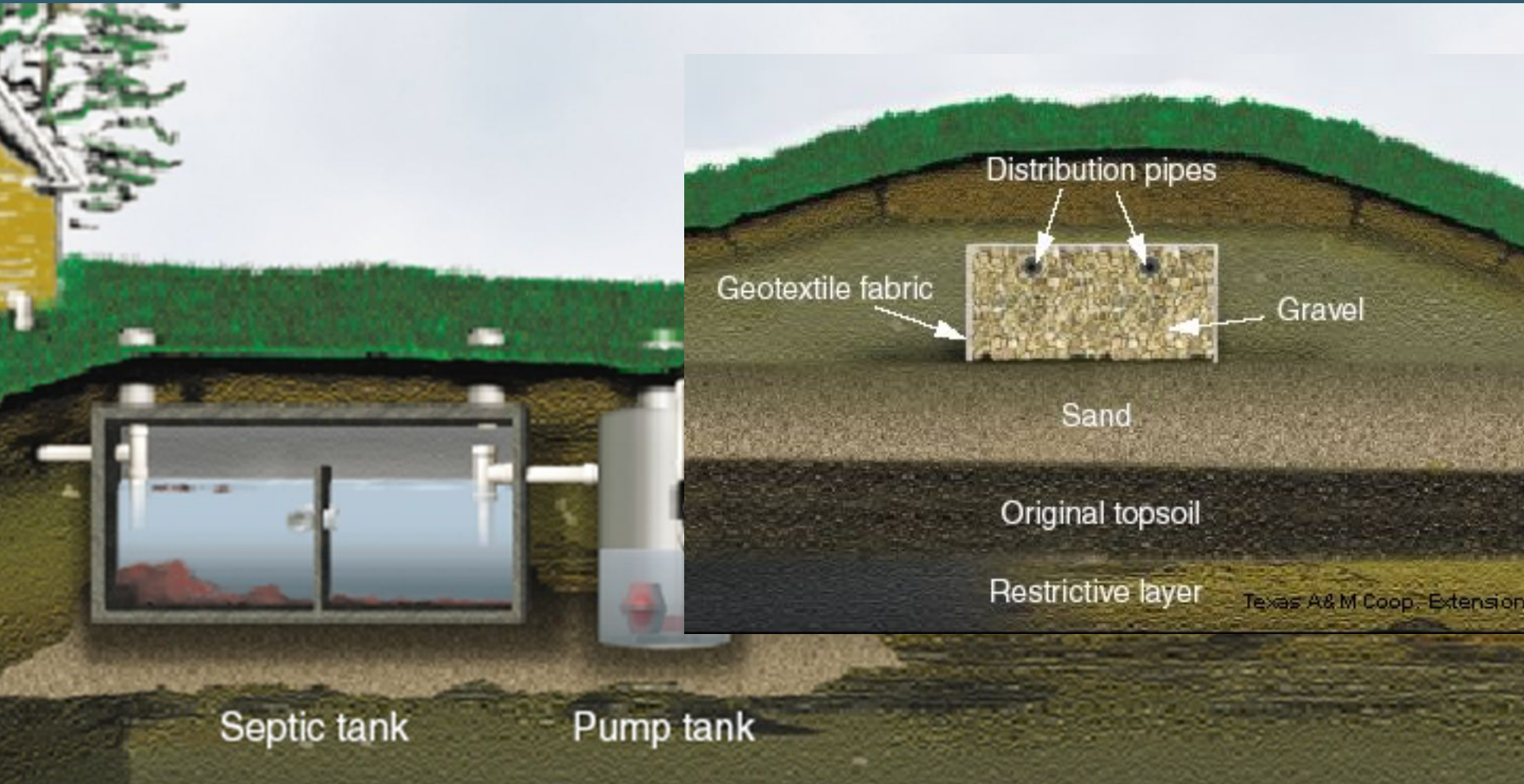
Leaching Chambers



Low-Pressure Distribution



Mound Distribution Field

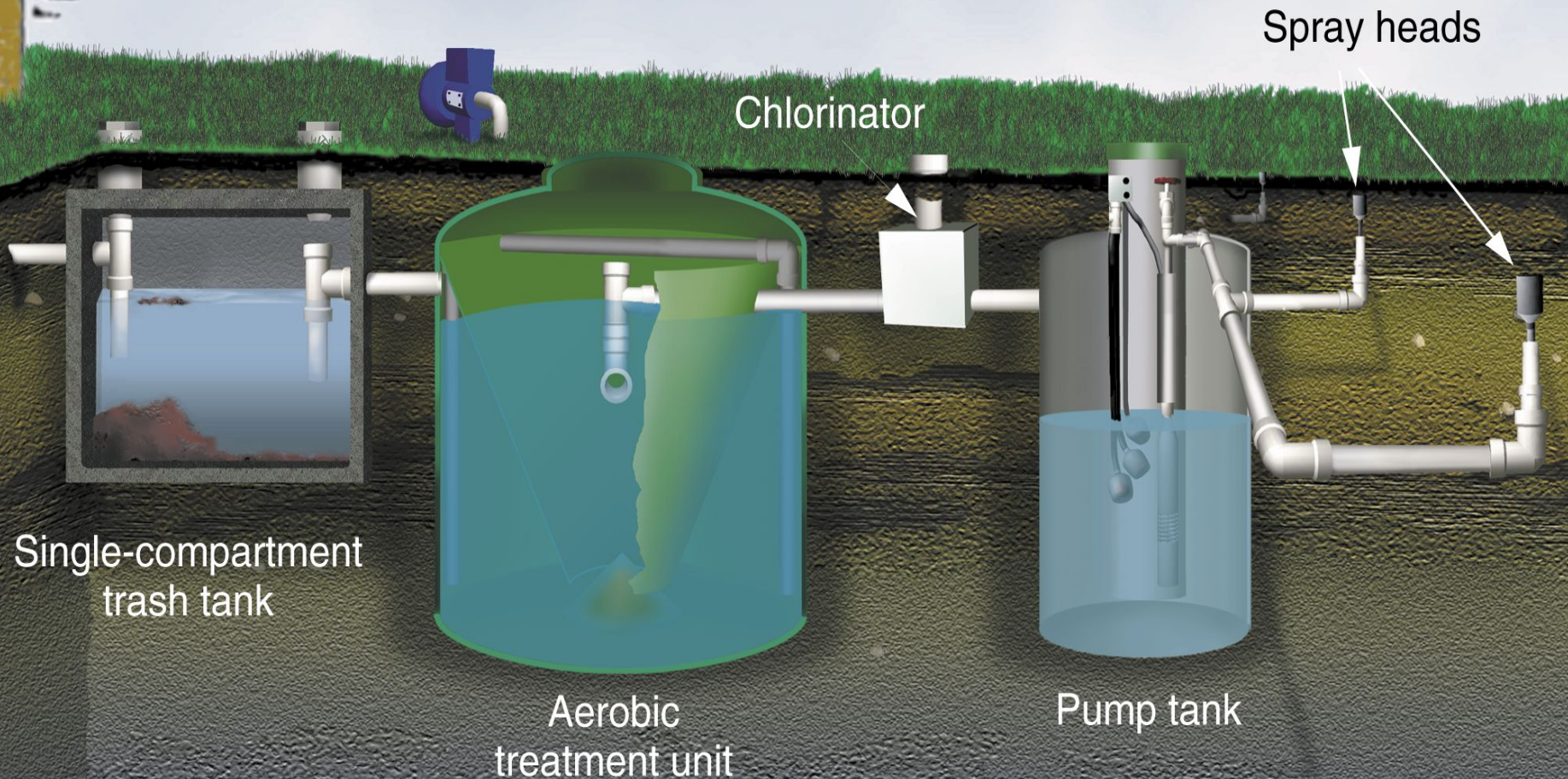


Role of Vegetative Cover in Treatment System

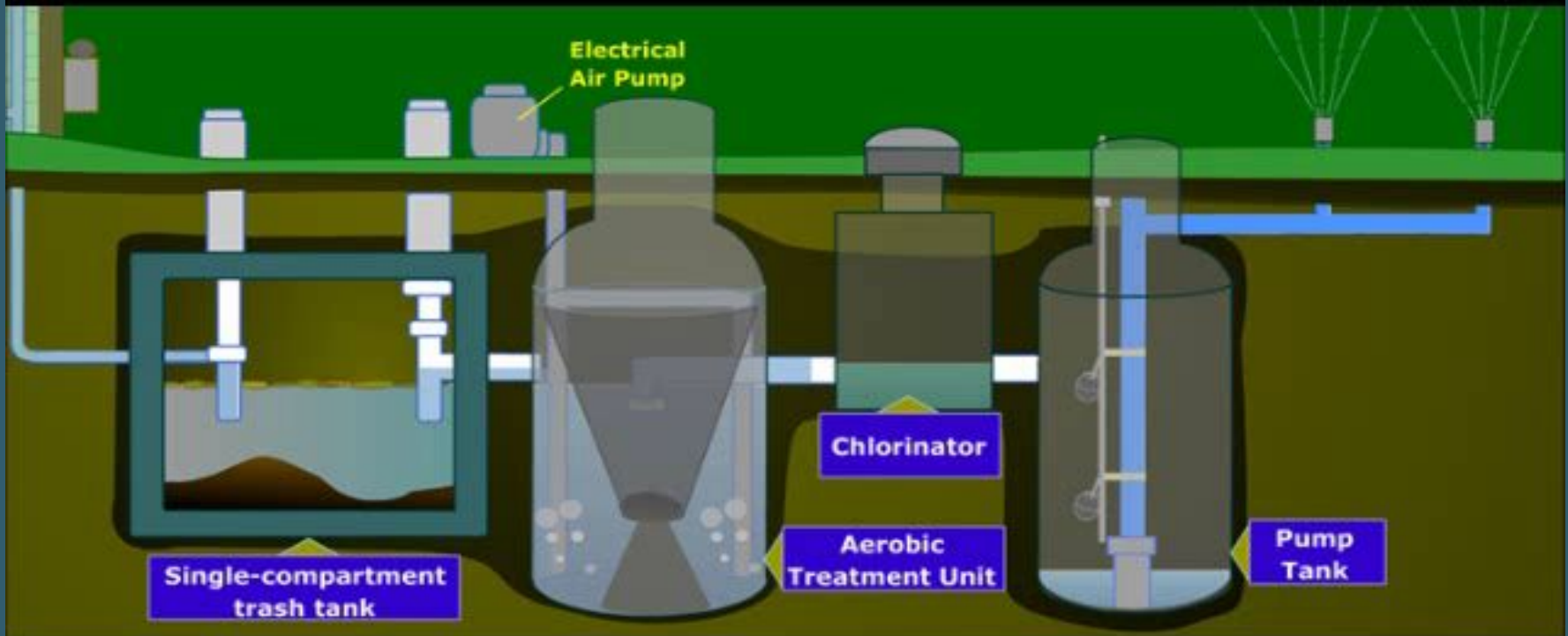


- A healthy cover crop is essential for the system to function properly.
- Plants will:
 - Take up water and nutrients
 - Stabilize the soil and prevent erosion
 - Support beneficial soil organisms
- Do NOT park vehicles on drainfield
- Do NOT construct decks, driveways or buildings over drainfield
- NO woody vegetation over drainfield

What is an Aerobic Treatment Unit?



What is an Aerobic Treatment Unit?



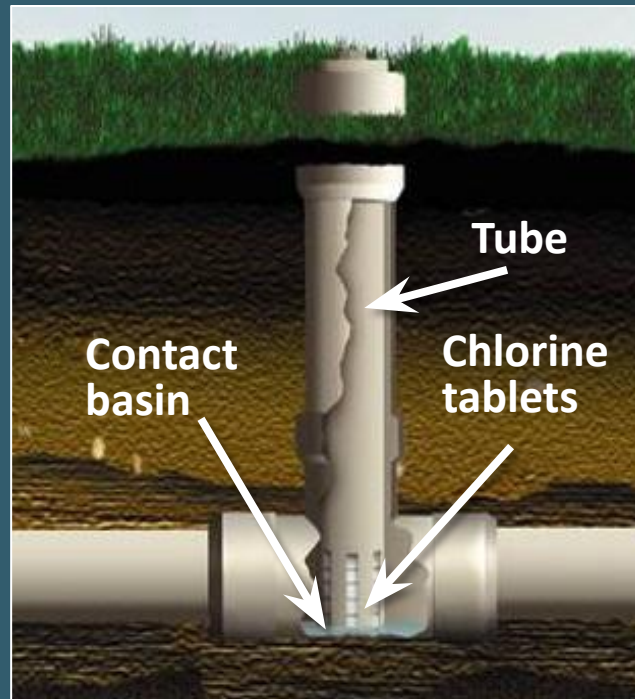
Aerobic Treatment Unit

- **Aerobic Microbes**
 - Require oxygen to live and grow
 - Consume waste and bacteria
- **Air supply**
 - Compressor / Aerator
 - Diffusers
 - Oxygen transfer to wastewater
 - Mixing of food and organisms
- **Clarifier**



Aerobic Treatment Unit System

- Disinfection
 - Disinfection, NOT sterilization!
 - Chlorinator
 - NOT SWIMMING POOL TABLETS!
 - UV light
- Distribution
 - Pump tank
 - Spray field
 - Subsurface drip



Water Quality – Spray Field

- High potential for human contact
- This is effluent – **NOT DRINKING WATER!!!!**
- Soil microbes are the final treatment!
- A healthy cover crop is essential for the system to function properly.
 - Take up water and nutrients
 - Stabilize the soil and prevent erosion
 - Provide food and habitat for beneficial soil organisms



Subsurface Drip Distribution



FEEDING THE SYSTEM

Conventional and Aerobic Systems

FATS, OILS AND GREASE

Constituent	State at room temperature	Comments
Fats	Solid	Non-toxic to the system, origin – animals, will separate in water
Oils	Liquid	Non-toxic to the system, origin – plants, trouble separating in water
Grease	Solid	Residual material on appliances; solid material on pans/equipment; petroleum products; moisturizers; bath oils; tanning oils; <u>Toxic</u> to the wastewater system

Kitchen

- Dishwasher
 - Hydraulic surges of wastewater
 - Space out loads
 - Organic load
 - Clean/scrape plates
- Garbage Disposal
 - Increases scum by 20%
 - Pumping required 1-2 years sooner
 - Organic matter has not been digested, so it will take longer to break down
 - Small particles take longer to settle



Laundry



- Use should be spread out
 - Returning from vacation
- Liquid soap is recommended
 - Use less
 - Remove risk of fillers in powders
 - Use bleach sparingly
- Consider a high efficiency washer

Bathroom

- Only urine, feces, soap, toilet paper and limited amounts of cleaner should go down the drain
- No feminine products, prophylactics, cigarette butts, etc.
- No every-flush toilet bowl sanitizers
- Bath and body oils
 - Increases fats, oils and grease
 - If usage is great, may need more maintenance



Septic Safe?

Toilet Paper

- Excessive use results in faster sludge build up
- Treated toilet paper (with lotions) prevents paper from settling
- Wet wipe disposal is discouraged

OPERATION AND MAINTENANCE OF SEPTIC SYSTEMS

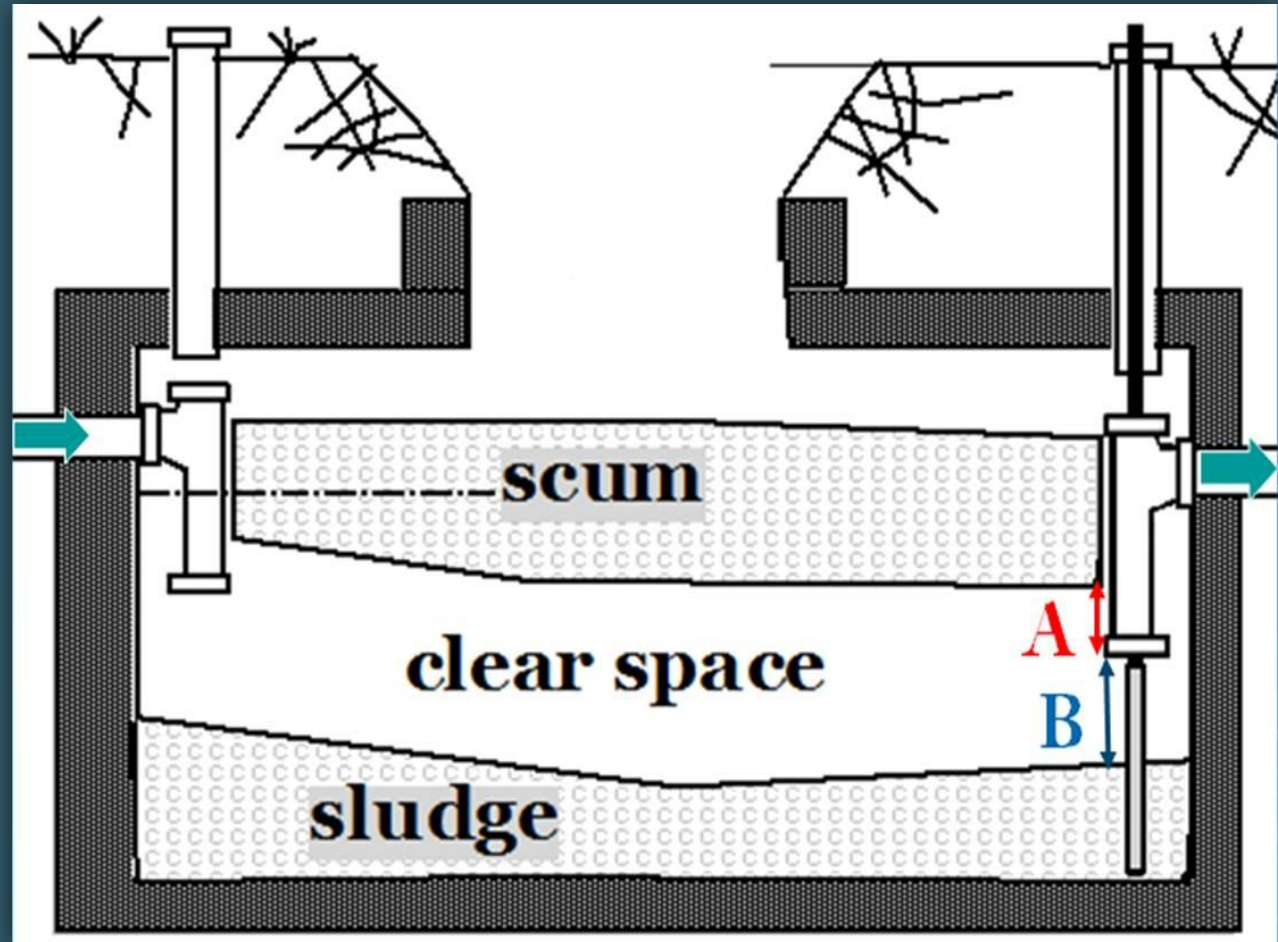
Pumping

- Removal of septage from a wastewater treatment system component
- Necessary to prevent accumulated solids from moving into downstream components
 - Drain fields
 - Pumps



Septic Tank Pumping Recommended?

- Should be pumped when total solids reach 25-33% of tank capacity
 - If 'A' is less than 3"
 - If 'B' is less than 12"
- Typically required every 3 to 5 years
- Pump during dry seasons to reduce the risk of tank floatation



Septic Tank Pumping Recommended?

Tank Size (gals)	Household Size (Number of People)									
	1	2	3	4	5	6	7	8	9	10
500	5.8	2.6	1.5	1.0	0.7	0.4	0.3	0.2	0.1	—
750	9.1	4.2	2.6	1.8	1.3	1.0	0.7	0.6	0.4	0.3
1,000	12.4	5.9	3.7	2.6	2.0	1.5	1.2	1.0	0.8	0.7
1,250		7.5	4.8	3.4	2.6	2.0	1.7	1.4	1.2	1.0
1,500		9.1	5.9	4.2	3.3	2.6	2.1	1.8	1.5	1.3
1,750			6.9	5.0	3.9	3.1	2.6	2.2	1.9	1.6
2,000			8.0	5.9	4.5	3.7	3.1	2.6	2.2	2.0
2,250				6.7	5.2	4.2	3.5	3.0	2.6	2.3
2,500					5.9	4.8	4.0	4.0	3.0	2.6

Note: More frequent pumping needed if a garbage disposal is used.

Contact Information

Dr. Jason R. Barrett

Associate Extension Professor

Associate Director

Mississippi Water Resources Research Institute

Mississippi State University Extension

133 Scales Building

Mississippi State, MS 39762

662.325.1788 phone

Jason.barrett@msstate.edu

www.wrri.msstate.edu