Decentralized Wastewater in America

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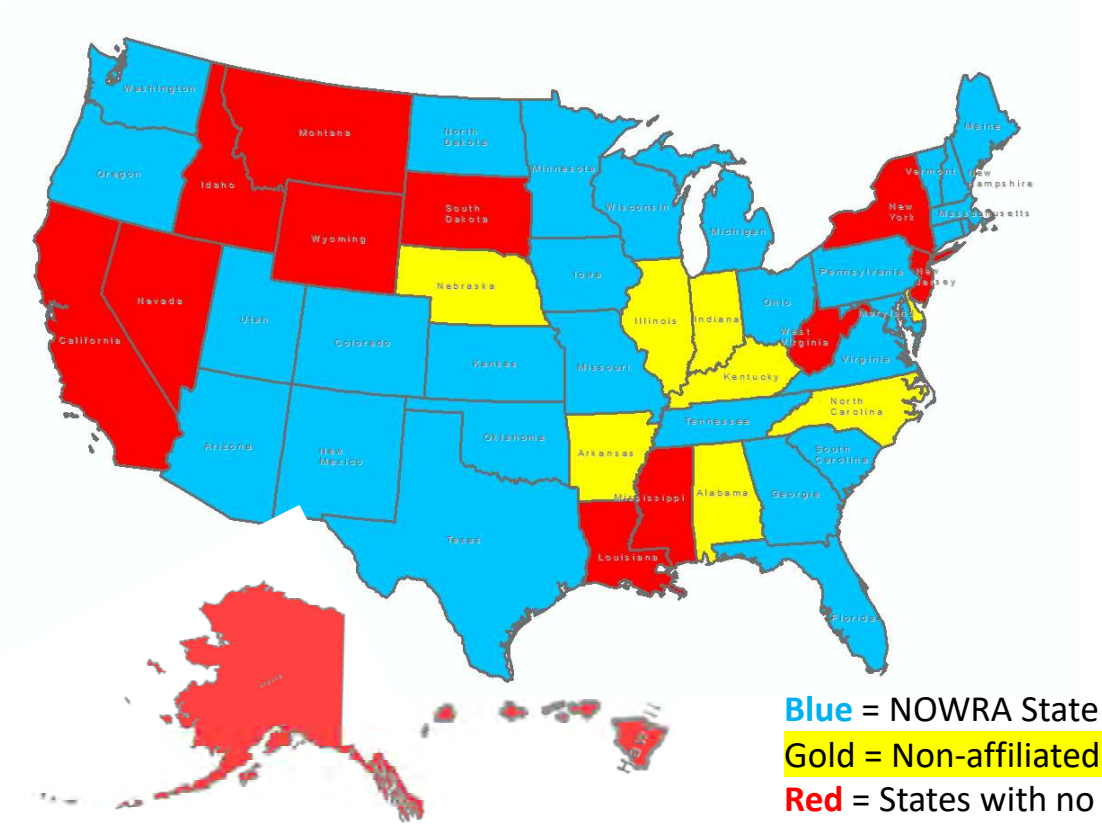
NOWRA
National Onsite Wastewater Recycling Association

National Onsite Wastewater Recycling Association (NOWRA)



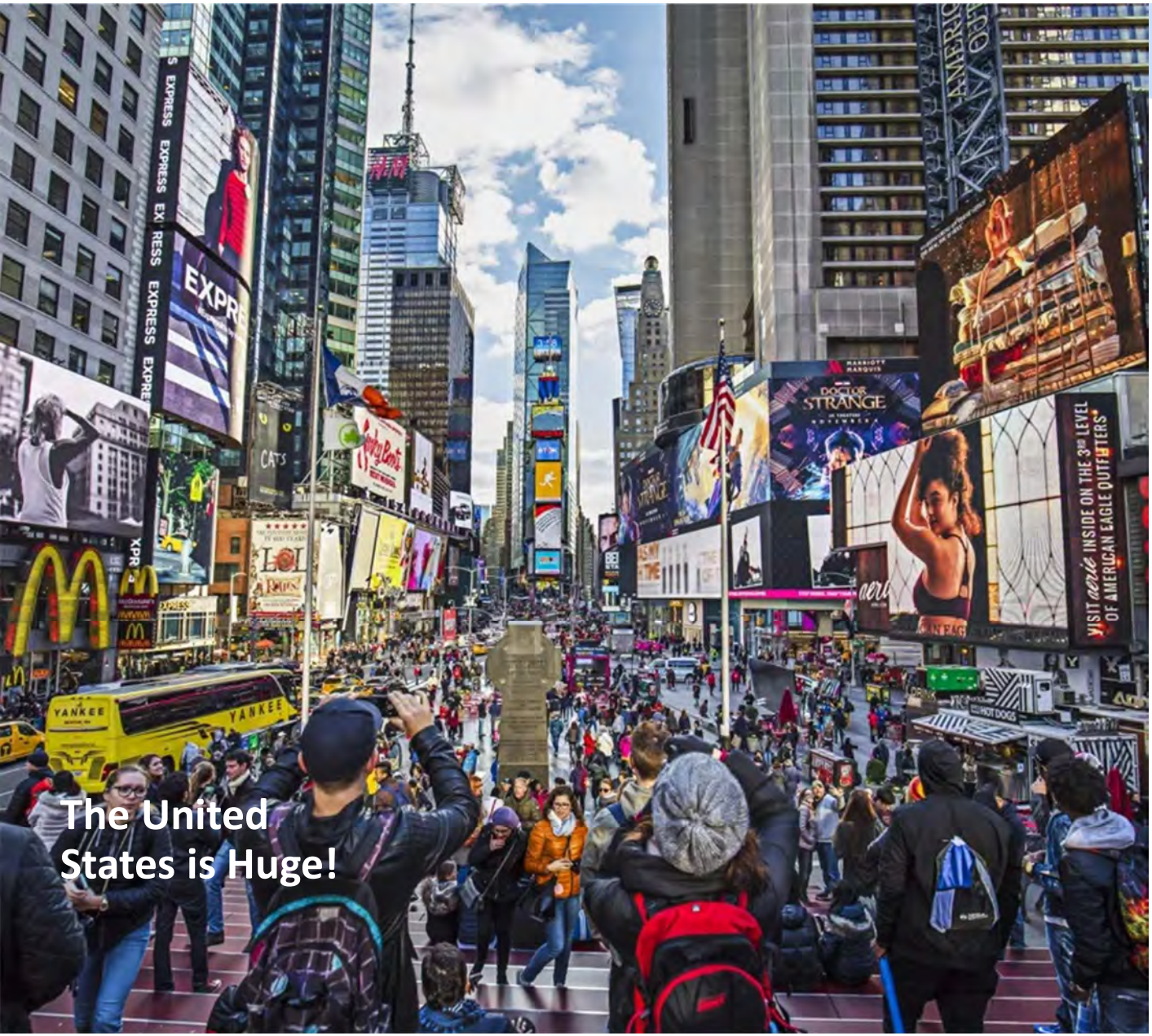
- AzOWRA (Arizona)
- CPOW (Colorado)
- FOWA (Florida)
- GOWA (Georgia)
- IOWWA (Iowa)
- KSFA (Kansas)
- MOWPA (Maryland)
- MOWRA (Michigan)
- MOWA (Minnesota)
- MSO (Missouri)
- NDOWRA (North Dakota)
- O2WA (Oregon)
- OOWA (Ohio)
- OOWA (Oklahoma)
- POWRA-NM (New Mexico)
- POWRA-PA (Pennsylvania)
- SCOWA (S. Carolina)
- TOWA (Tenn)
- TxOWA (Texas)
- UOWA (Utah)
- VOWRA (Virginia)
- WOSSA (Washington)
- WOWRA (Wisconsin)
- YOWA (New England)

Blue = NOWRA State Affiliates
Gold = Non-affiliated state organizations
Red = States with no onsite association

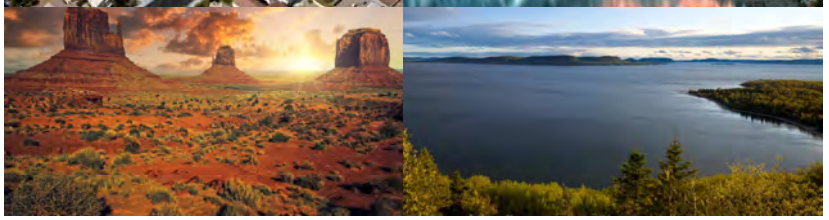
5,500+ Members

29 states

24 affiliates



The United States is Huge!



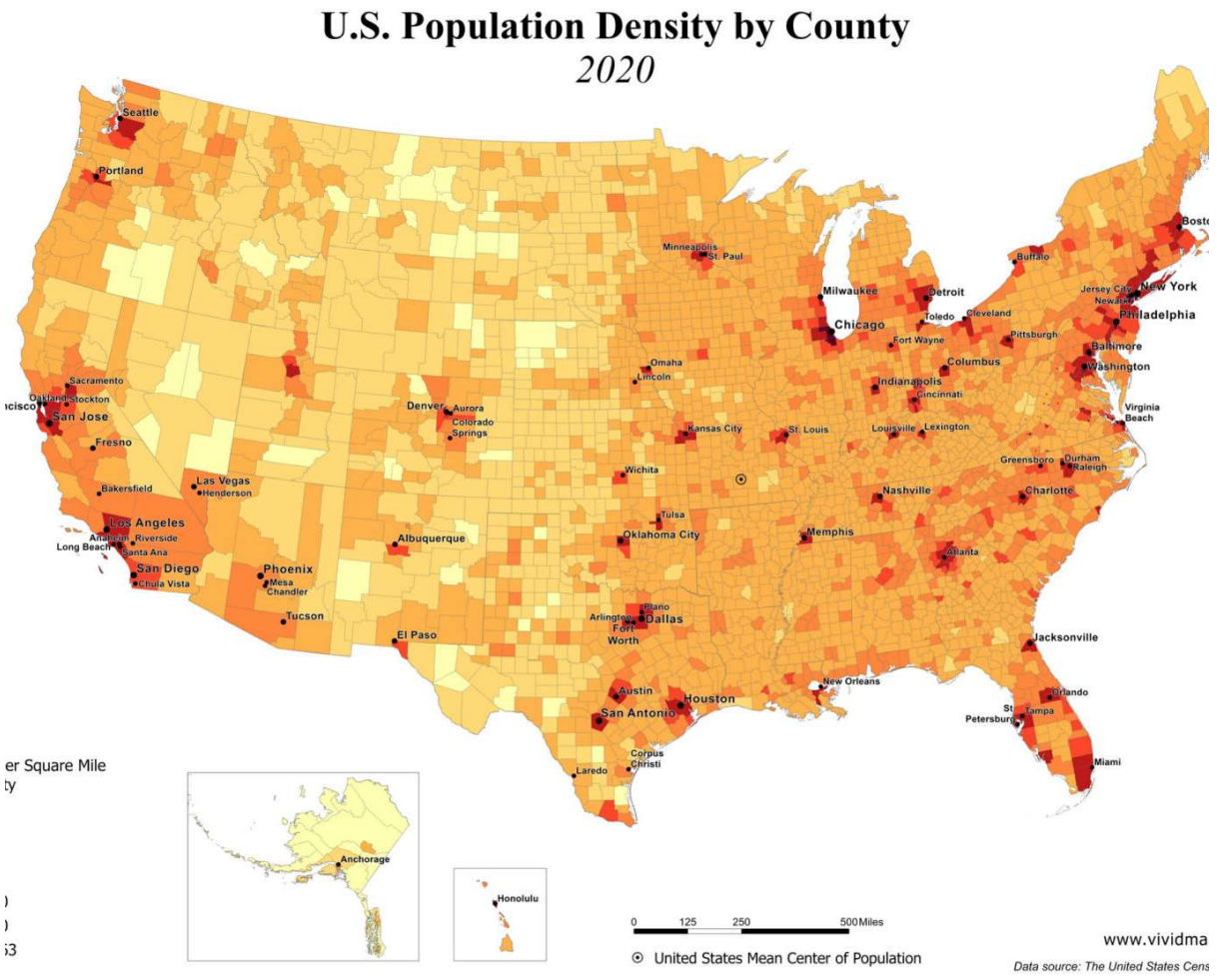
- United States:
  - 342 million people
  - 3,809,525 mi^2 (9,866,624 km^2)
  - 89.8/mi^2 (34.7/km^2)
- Japan:
  - 124 million people
  - 145,937 mi^2 (377,975 km^2)
  - 849.7/mi^2 (328.1/km^2)


WASHINGTON
MONTANA
NORTH DAKOTA
MINNESOTA
SOUTH DAKOTA
WISCONSIN
MICHIGAN
OREGON
IDAHO
WYOMING
NEBRASKA
IOWA
ILLINOIS
NEVADA
UTAH
COLORADO
KANSAS
MISSOURI
INDIANA
OHIO
PENN
NEW YORK
VT
NH
MAINE
MA
CT RI
NB
MD
DE
NJ
WEST VIRGINIA
KENTUCKY
VIRGINIA
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
ARKANSAS
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
LOUISIANA
TEXAS
ARIZONA
NEW MEXICO
CALIFORNIA
United States
Mexico
Ottawa
Montreal
Toronto
Chicago
Philadelphia
San Francisco
Las Vegas
Los Angeles
San Diego
Dallas
Houston
Gulf of California
Gulf of Mexico

Decentralized Wastewater in America

25% of Americans (31 million households) do not have access to centralized wastewater management and rely on decentralized wastewater management

- **Onsite systems**
- **Septic systems**
- **Subsurface sewage treatment systems**

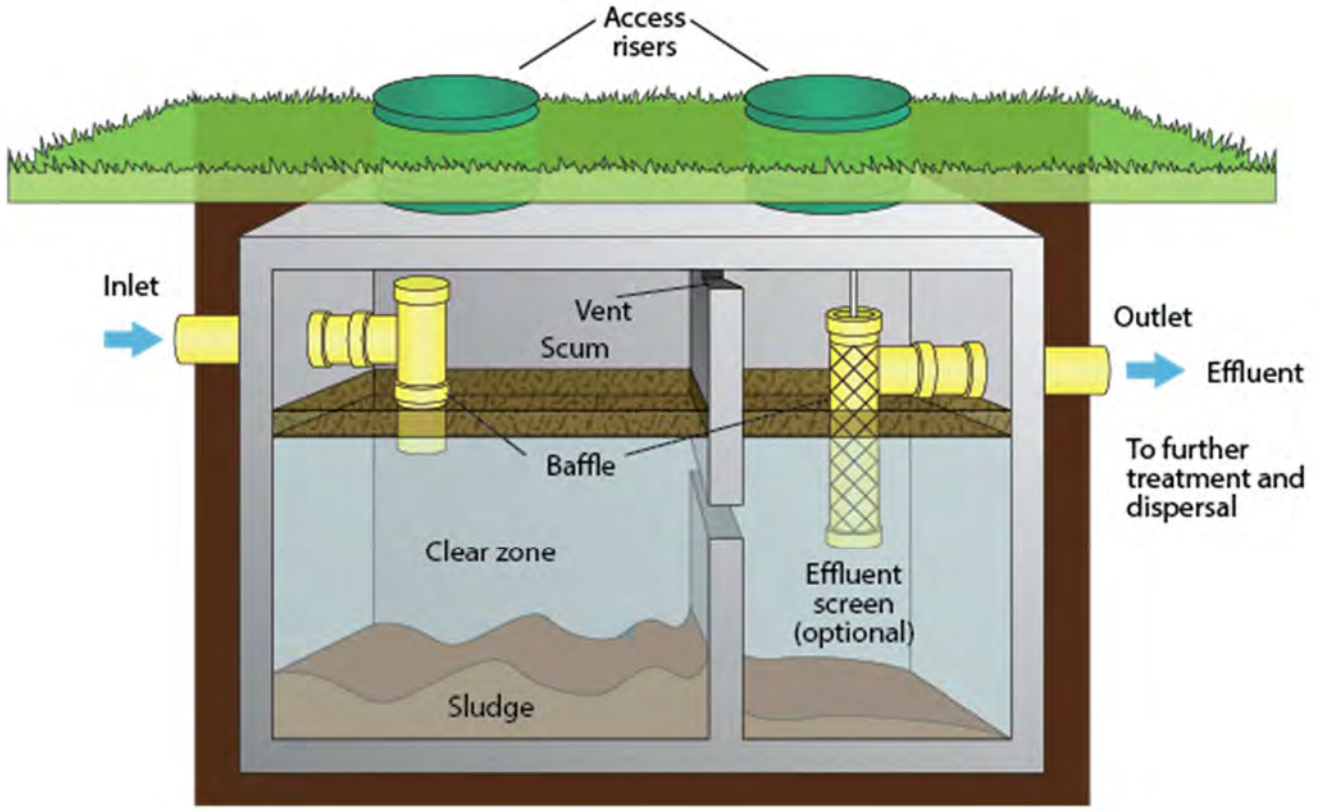


Decentralized Wastewater in America

- The overall goal of design standards of decentralized wastewater management systems is to maintain swimmable, fishable and drinkable water.
  - Surface water – lakes, rivers, streams
  - Groundwater aquifers – source of drinking water for 38% of Americans

Septic Tank

- Primary Treatment
  - Septic tank separates solids, fats/oils, liquid
  - Solids & Fats/Oils accumulate in the tank
  - Effluent (liquid) leaves the tank

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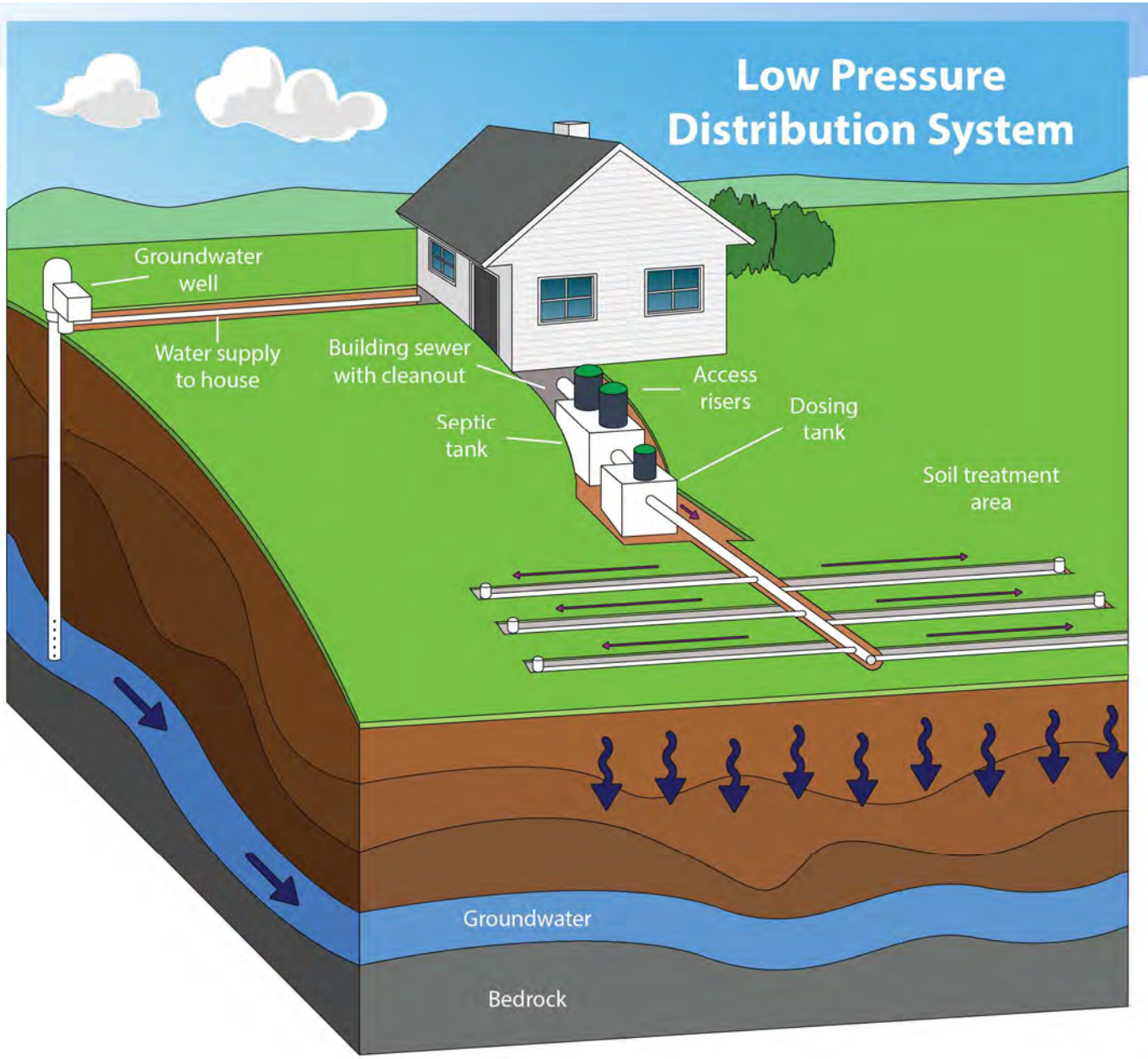
Soil Treatment Area

- **Secondary Treatment & Dispersal**
  - **Distributes effluent over infiltrative area**
  - **Unsaturated soil under soil treatment area**
    - **Aerobic microorganisms in the soil consume pathogenic microorganisms in the effluent**



Treatment Performance of Soil

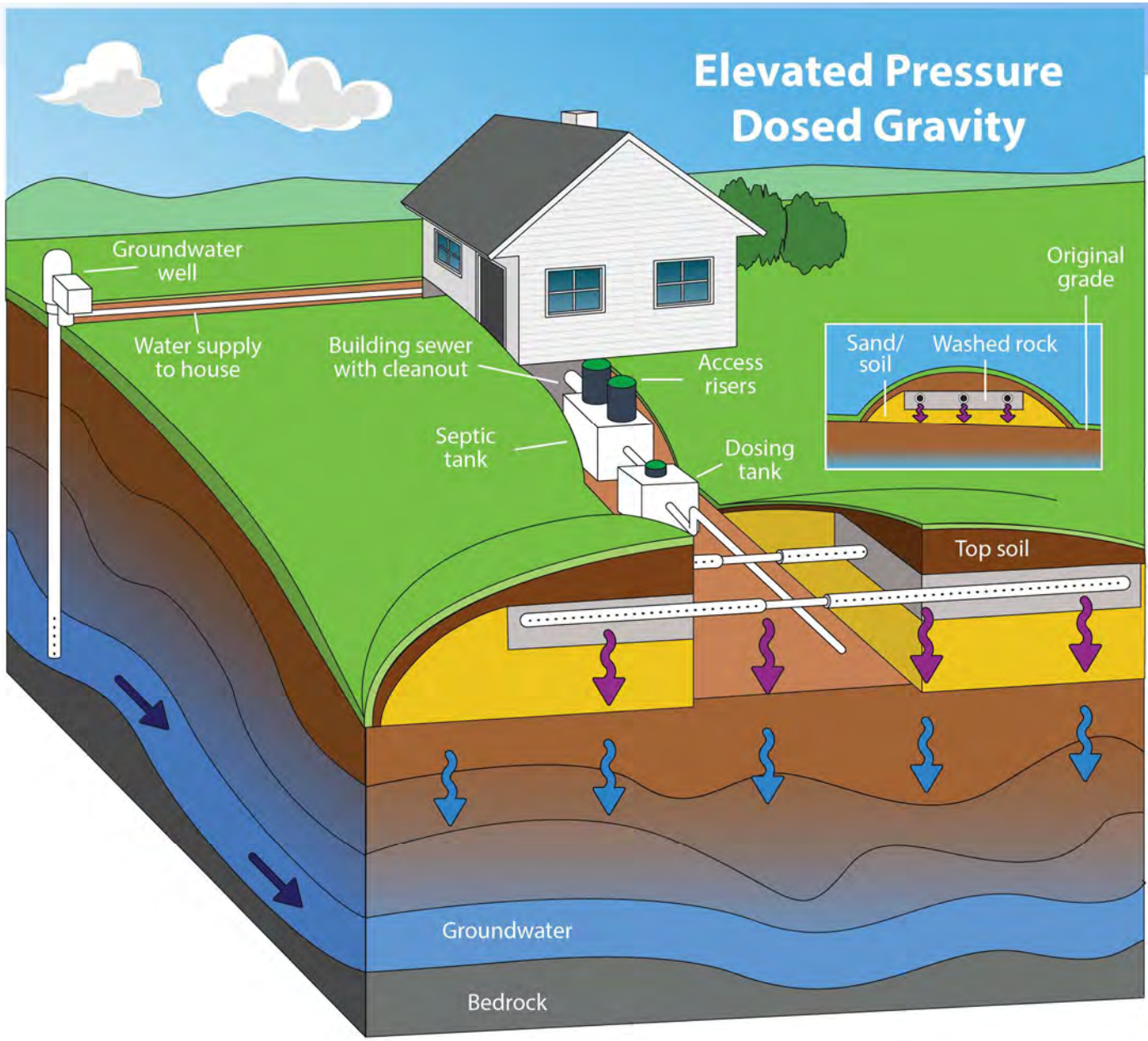
Contaminant	Raw Waste	Septic Tank Effluent	One Foot Below Trench	Three Feet Below Trench
BOD (mg/L)	270-400	140-220	0	0
TSS (mg/L)	300-400	45-65	0	0
Fecal Coliform (MPN/100ml)	1,000,000-100,000,000	1,000-1,000,000,000	0-100	0
Viruses (PFU/ml)	unknown	1,000-1,000,000,000	0-1,000	0
Nitrogen				
Total (mg/L)	100-150	50-60	-	-
NH_4 (mg/L)	60-120	30-60	*B-60	*B
NO_3 (mg/L)	<1	<1	*B-40	*B-40
Total Phosphorus (mg/L)	10-40	10-30	*B-10	*B-1

*B=Background

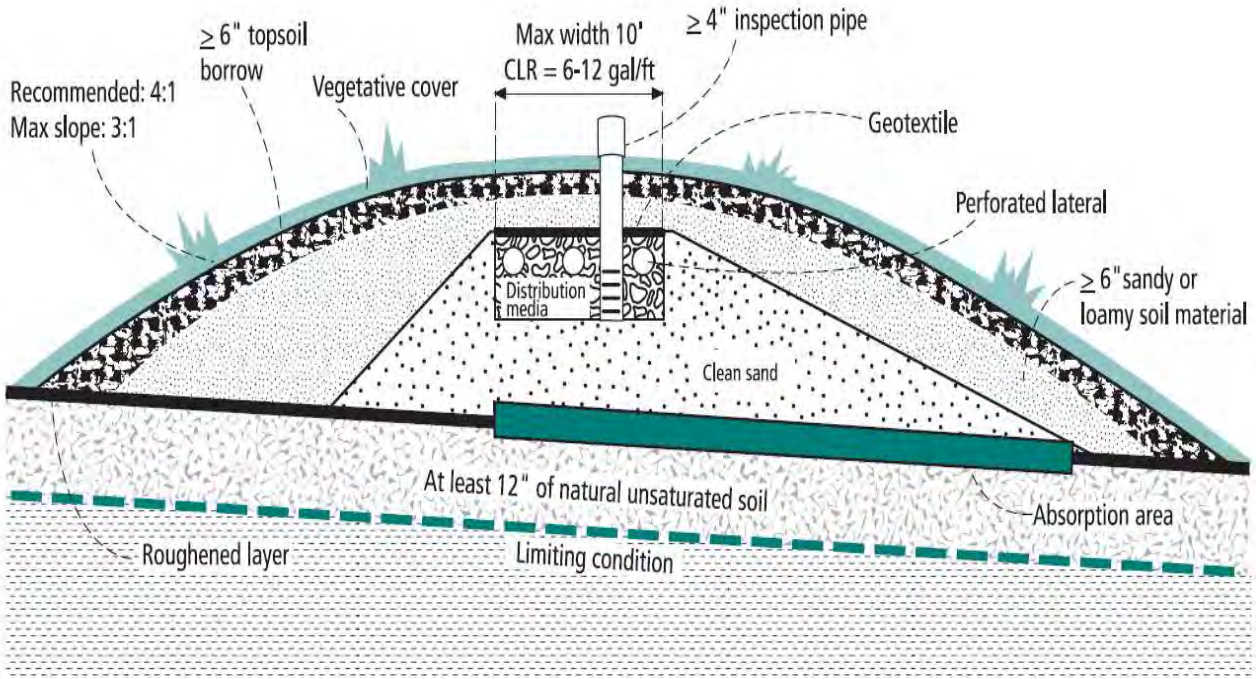
Soil Treatment Area – Gravity Trench “Drainfield”

Soil Treatment Area

- Above ground soil treatment and dispersal area
  - Used if property has high-water table conditions
- Commonly referred to as a “mound” system

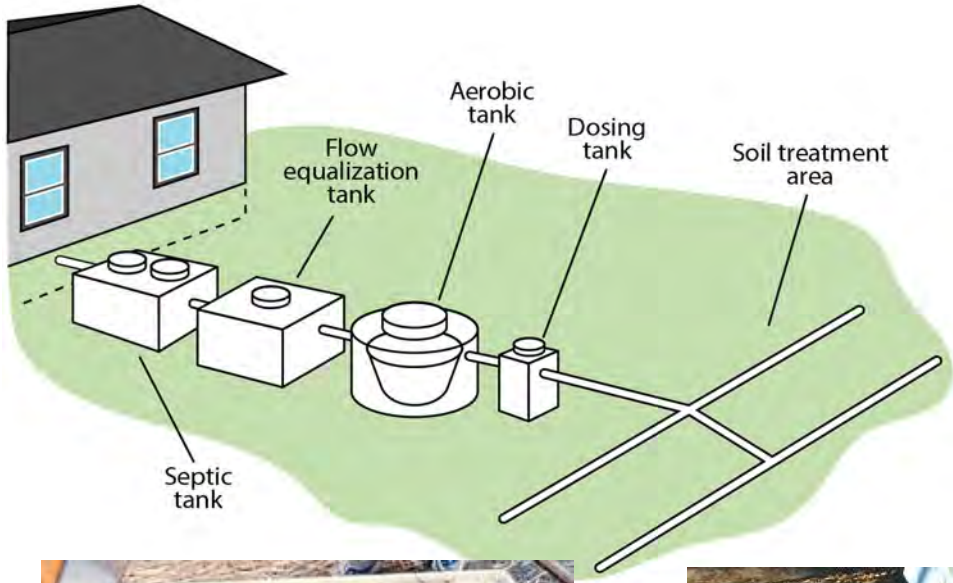


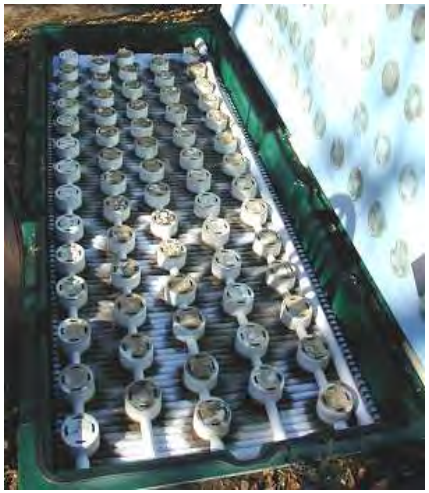
Soil Treatment Area – Above Ground “Mound”



Advanced Treatment Systems

- Most systems are designed for domestic strength waste:
  - Biochemical Oxygen Demand BOD ≤ 170 mg/L
  - Total Suspended Solids ≤ 70 mg/L
  - Oil & Grease ≤ 25 mg/L
- Any system with elevated levels of those constituents must pre-treat the waste prior to discharging to the soil
  - Aerobic Treatment Unit (ATU)
- These advanced systems need more frequent and more robust operation and maintenance by a licensed Service Provider



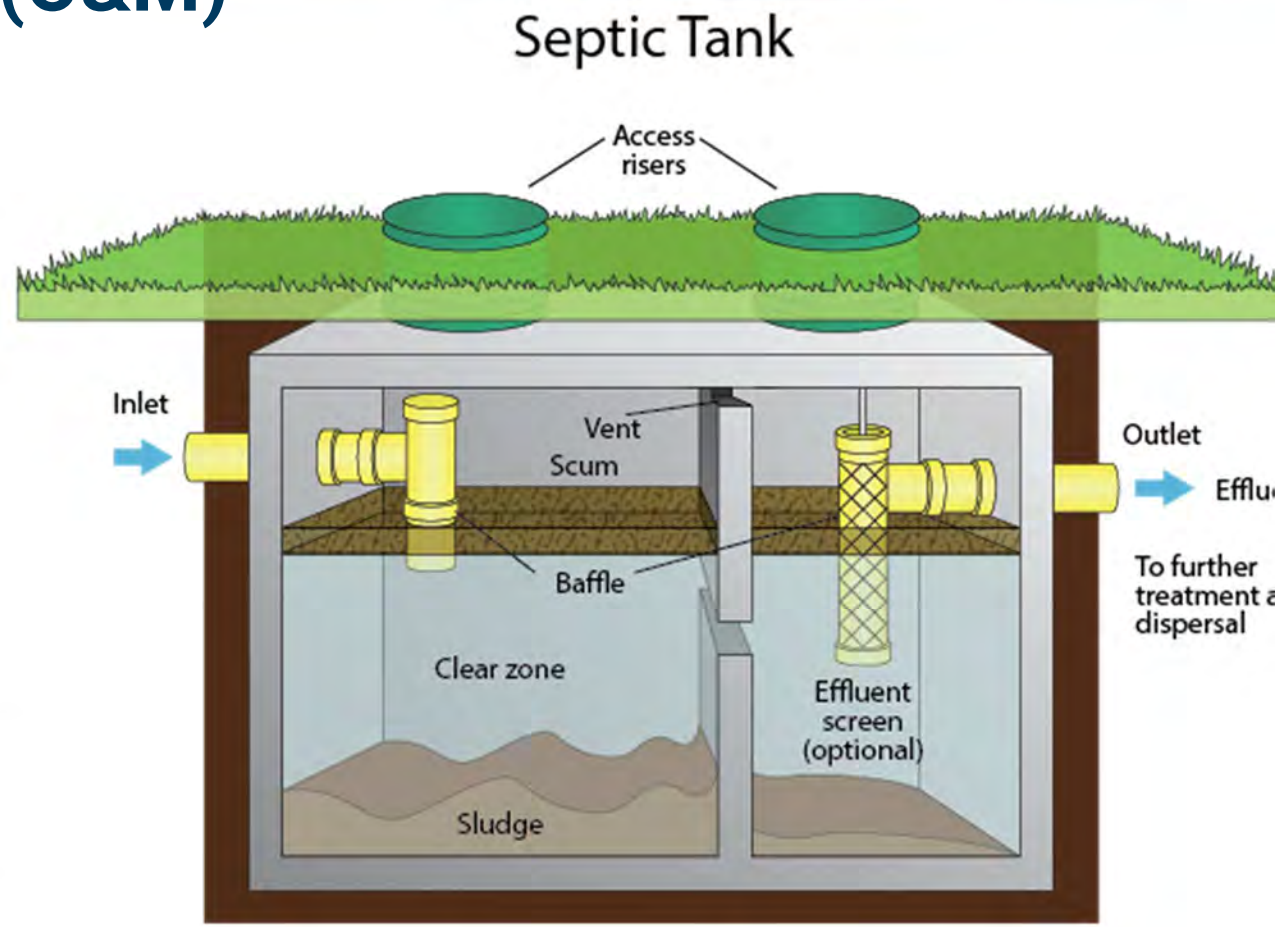


Regulatory Framework

- The decentralized wastewater industry in the United States is not regulated federally.
  - Regulation of decentralized wastewater systems are left up to each state.
  - Some states have different regulations county by county
- The U.S. Environmental Protection Agency does enforce U.S. Code of Federal Regulations Title 40, Part 503 regarding the land application of septage

Operation & Maintenance (O&M)

- Primary Treatment
  - Septic tank separates solids, fats/oils, liquid
  - Effluent (liquid) leaves the tank
  - Solids & Fats/Oils accumulate
- The accumulated solids/fats & oils must be periodically removed by pumping out the contents of the septic tank
- Critical in maintaining the system

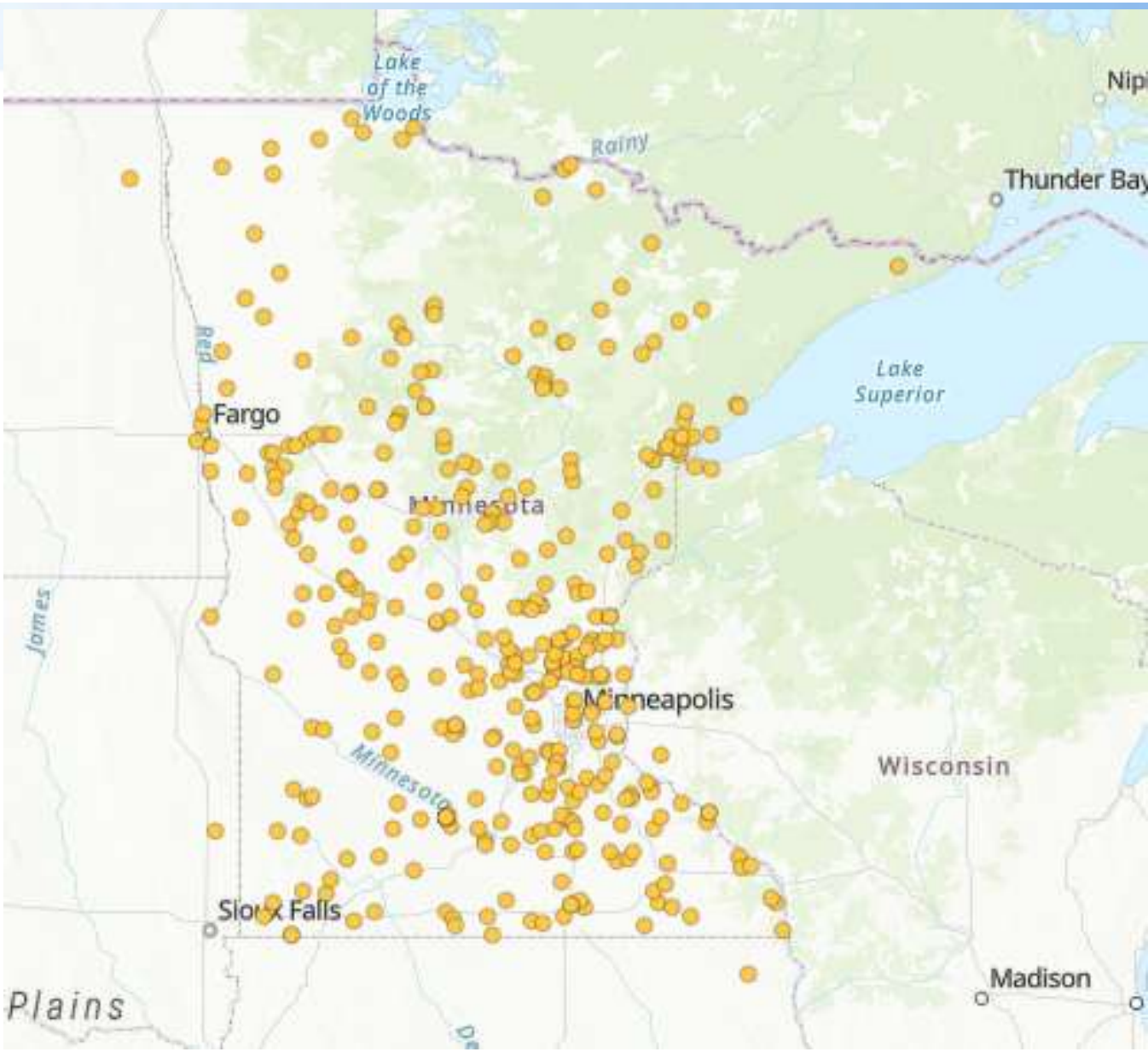


Operation & Maintenance (O&M)

- State and local regulations require that decentralized systems be periodically maintained
  - In Minnesota, the owner of decentralized system is required by code to remove the solids from the septic tank once every three years
  - Must be performed by a licensed maintainer
  - Pumper truck disposes of septage at the local municipal wastewater treatment plant, or more commonly in the rural parts of the US, land applies the septage on a farm field

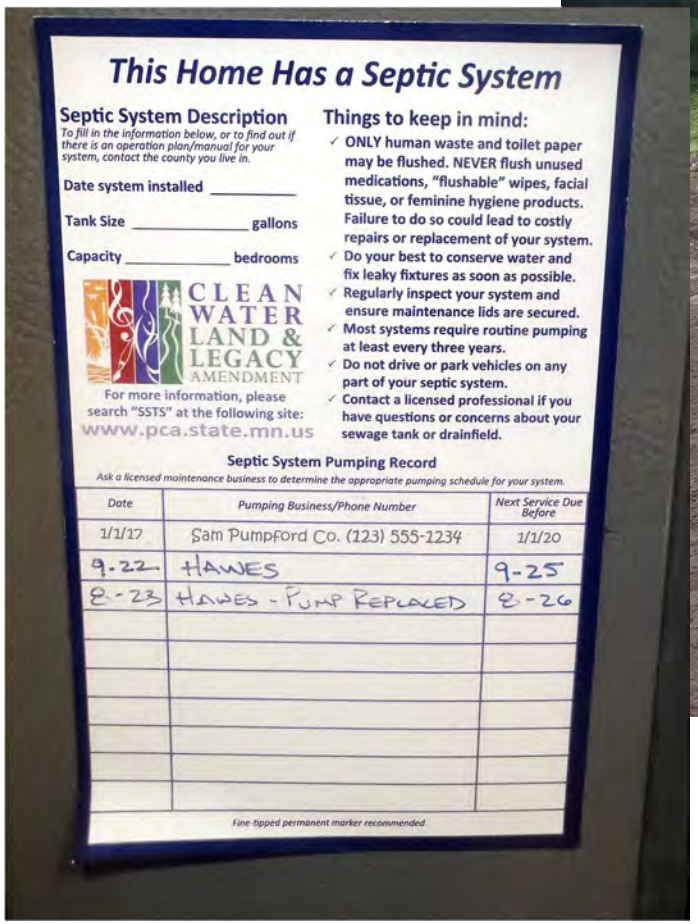
Operation & Maintenance (O&M)

- 383 Licensed Maintainers in Minnesota
  - Required to take several courses at the University of Minnesota
    - Intro – 3-day course & exam
    - Maintainer – 5-day course & exam
- Licensed Maintainer businesses must obtain 18 hours of continuing education every three years keep license current



Operation & Maintenance (O&M)

- Challenges with operation & maintenance
  - Getting people to remember to maintain their system – memories fade
    - Lack of enforcement at local level
  - Homeowners turning off alarm
- Solutions
  - Refrigerator magnets
  - Detailed pumping records
    - Maintainers keep lists of customers and when their system was pumped last
  - Some local units of government will send out reminder postcards
  - My office requires maintainers to submit data online for each system maintained
    - Allows us to inform homeowners when maintenance is due
    - System automatically sends a homeowner an email (if we have it) when the system is three months from being due for maintenance



This Home Has a Septic System

Septic System Description

To fill in the information below, or to find out if there is an operation plan/manual for your system, contact the county you live in.

Date system installed _____

Tank Size _____ gallons

Capacity _____ bedrooms

CLEAN WATER LAND & LEGACY AMENDMENT

For more information, please search "SSTS" at the following site:
www.pca.state.mn.us

Things to keep in mind:

- ✓ ONLY human waste and toilet paper may be flushed. NEVER flush unused medications, "flushable" wipes, facial tissue, or feminine hygiene products. Failure to do so could lead to costly repairs or replacement of your system.
- ✓ Do your best to conserve water and fix leaky fixtures as soon as possible.
- ✓ Regularly inspect your system and ensure maintenance lids are secured.
- ✓ Most systems require routine pumping at least every three years.
- ✓ Do not drive or park vehicles on any part of your septic system.
- ✓ Contact a licensed professional if you have questions or concerns about your sewage tank or drainfield.

Septic System Pumping Record

Ask a licensed maintenance business to determine the appropriate pumping schedule for your system.

Date	Pumping Business/Phone Number	Next Service Due Before
1/1/17	Sam Pumpford Co. (123) 555-1234	1/1/20
9-22	HAWES	9-25
8-23	HAWES - PUMP REPLACED	8-26

Fine-tipped permanent marker recommended

EPA Requirements – Land Application of septage

- Code of Federal Regulations, 40 CFR 503
  - Applies to any person who applies sewage sludge to the land, to sewage sludge applied to the land, and to the land on which sewage sludge is applied.

Direct Application w/Lime

Injection/Incorporation

EPA Requirements – Land Application of Septage

- Pathogen/Vector attraction reduction
  - Injection/incorporation
  - Lime to pH of 12
- No application when ground frozen
- Annual nitrogen application rate
- Record keeping
  - Location where septage applied
  - Number of acres
  - Date of each application
  - Nitrogen requirement for the crop grown
  - The rate (gallons per acre per 365 days) applied
  - How pathogen requirements were met
  - How vector attraction reduction was met

Restricted Activity	Waiting Period
Food crops whose harvested part may touch the soil/septage (melons, squash, tomatoes, etc.)	14 months
Food crops with harvested parts below the surface (potatoes, carrots, etc.)	38 months
Feed, food, or fiber crops that do not touch the soil surface (field corn, sweet corn, soybeans, hay, etc.)	30 days

EPA Requirements – Land Application of Septage

Slope & Season Requirements

Slope (%)	Surface Application	Injection or Immediate Incorporation
Summer		
0-6%	Allowed	Allowed
>6-12%	Not Allowed	Allowed
>12%	Not Allowed	Not Allowed
Winter		
Only areas with slopes from 0-2% can be used for winter applications of septage		

EPA Requirements – Land Application of septage

Setback Requirements

Feature	Surface Applied	Incorporated within 48 hours	Injected
Private drinking water supply wells	200 ft		
Public drinking water supply wells	1000 ft		
Irrigation wells	50 ft		25 ft
Residences	200 ft		100 ft
Residential developments	600 ft		300 ft

Questions?

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