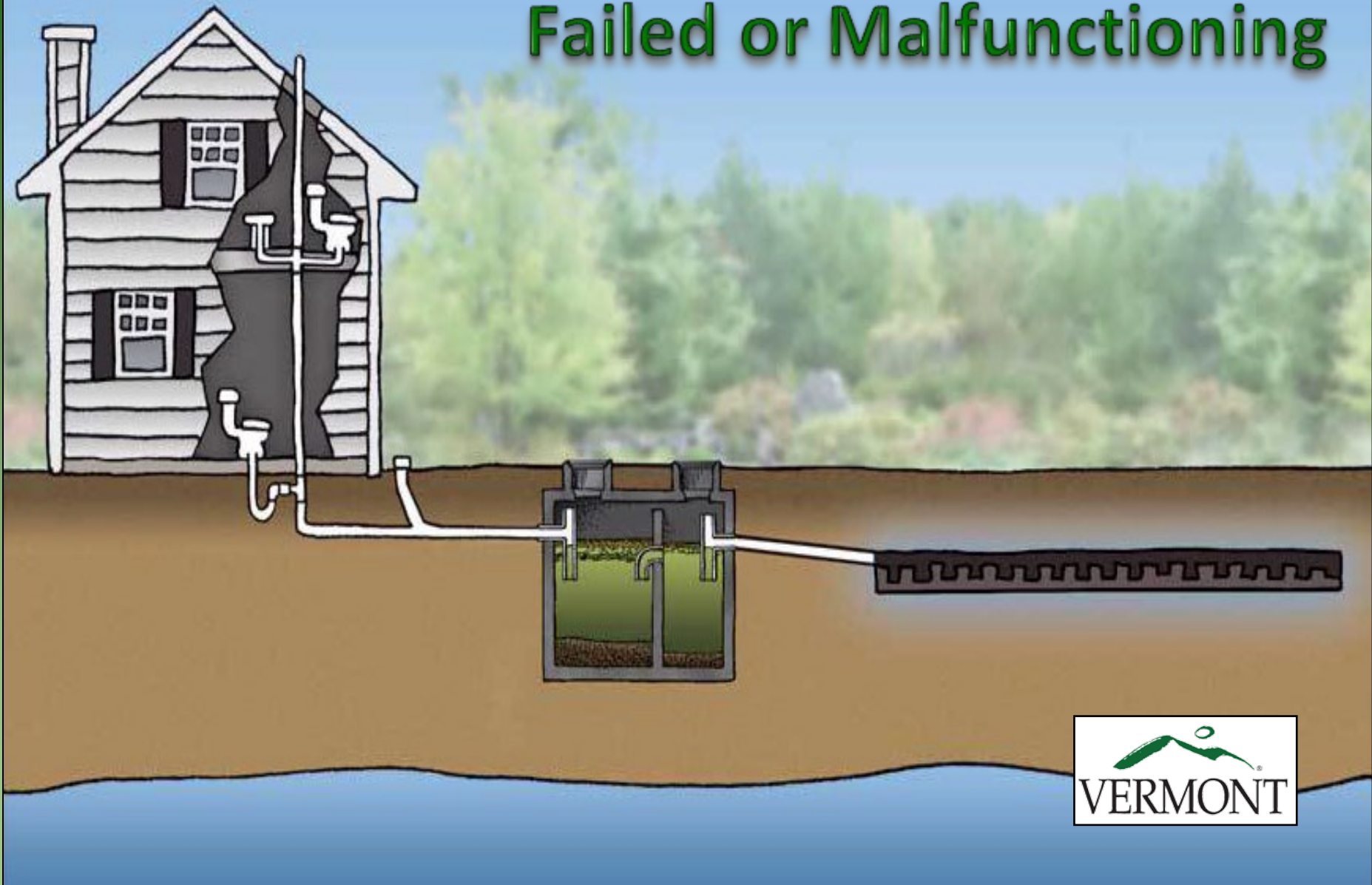


Wastewater Systems 101

Failed or Malfunctioning



Wastewater Systems 101

Failed or Malfunctioning

Who

Cristin Ashmankas

Hydrogeologist & Sedimentologist

**Drinking Water and Groundwater Protection
Division, DEC, ANR**

Mary O'Leary, Professor

Civil & Environmental Engineering Technology

Vermont Technical College

Part-time Analyst, DWGPD, DEC, ANR



Wastewater Systems 101

Resources referenced today:

Wastewater Systems 101 Malfunctioning or Failed WW Systems, a guidance document for Regulators

Short Sheet Series

- Homeowner
- Contractors
- Licensed Designers



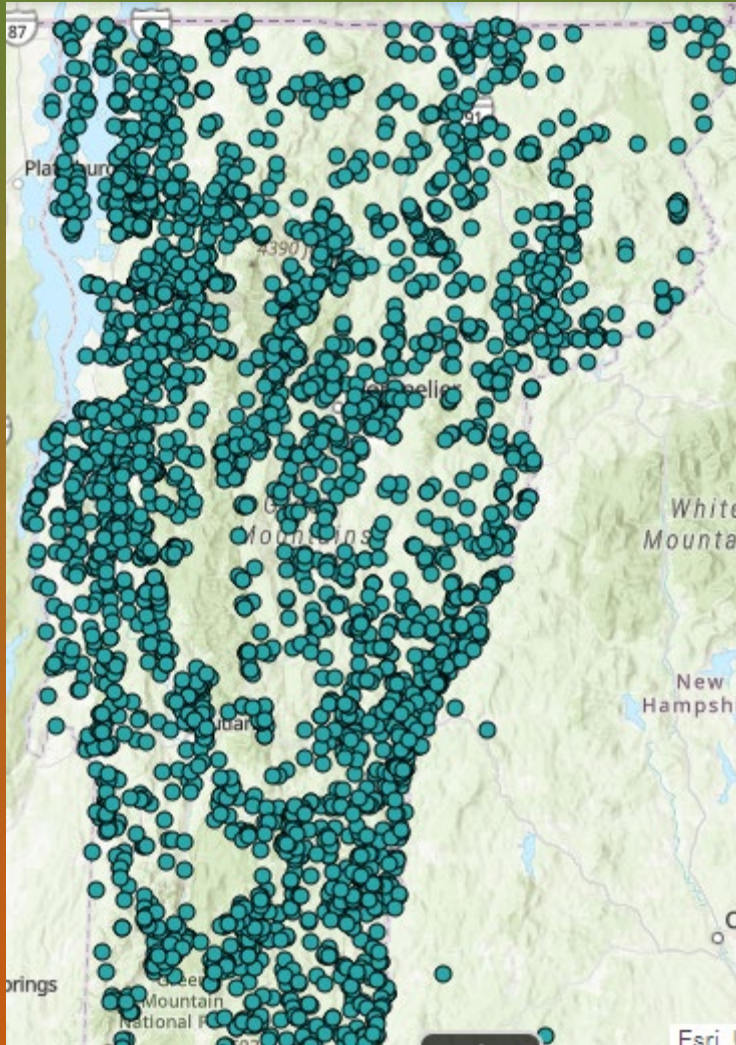
<http://dec.vermont.gov/water/programs/ww-systems/program-education>



Wastewater Systems 101

1. **Some stats - Failed Systems in Vermont**
2. **A reminder: how on-site Soil based WW Systems work**
3. **What you might see on a property - Failed or Malfunctioning?**
4. **Wastewater & Water Supply Rules**
5. **Homeowner Education**
6. **Contacts & Questions?**

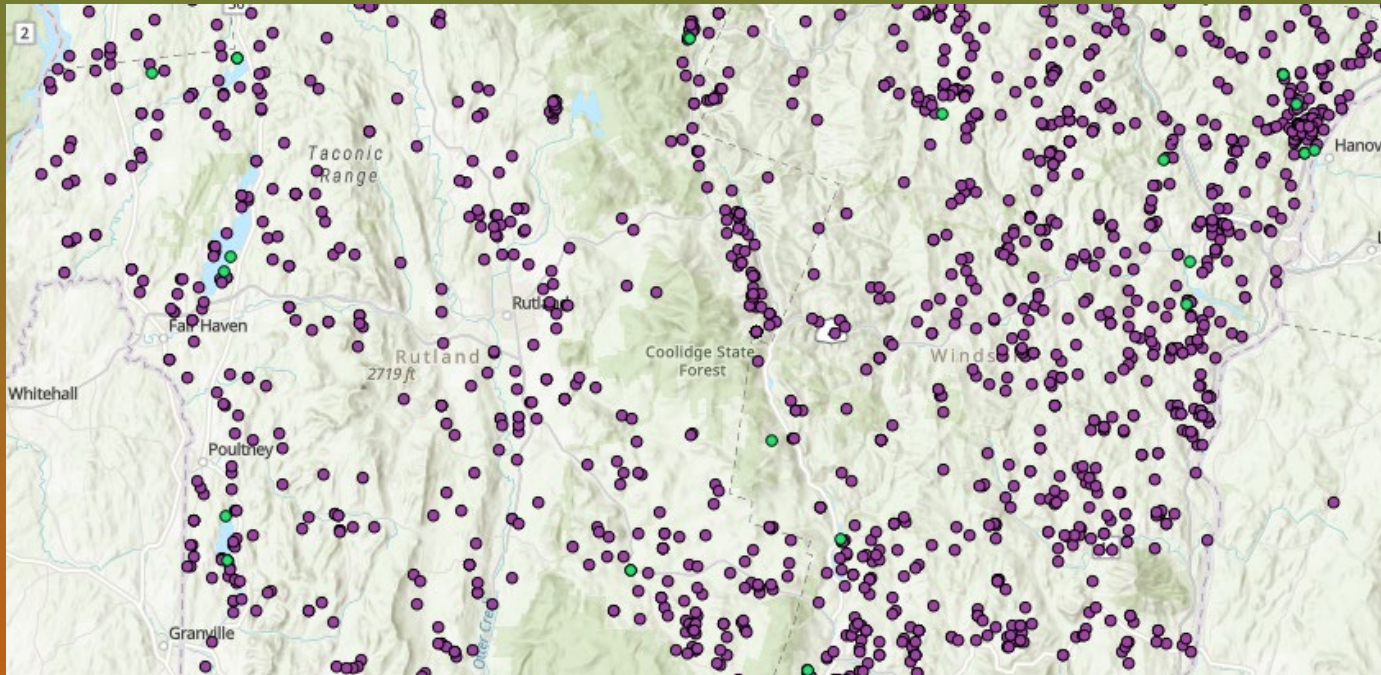
Wastewater Systems 101



3200+ Failed systems
since 2017
(reported, permitted
& replaced)

Wastewater Systems 101

Mound & Bottomless Sand Filters replacement systems



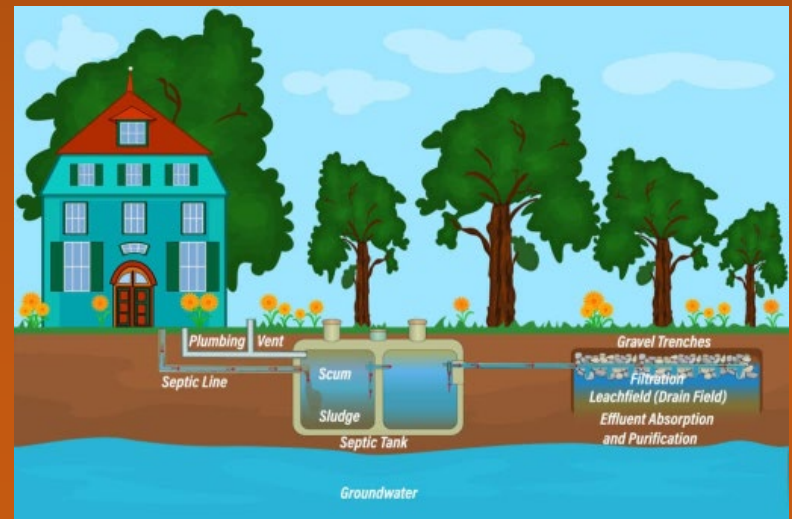
Historically 400-500 failed systems/yr, now 600+/year

ARPA!

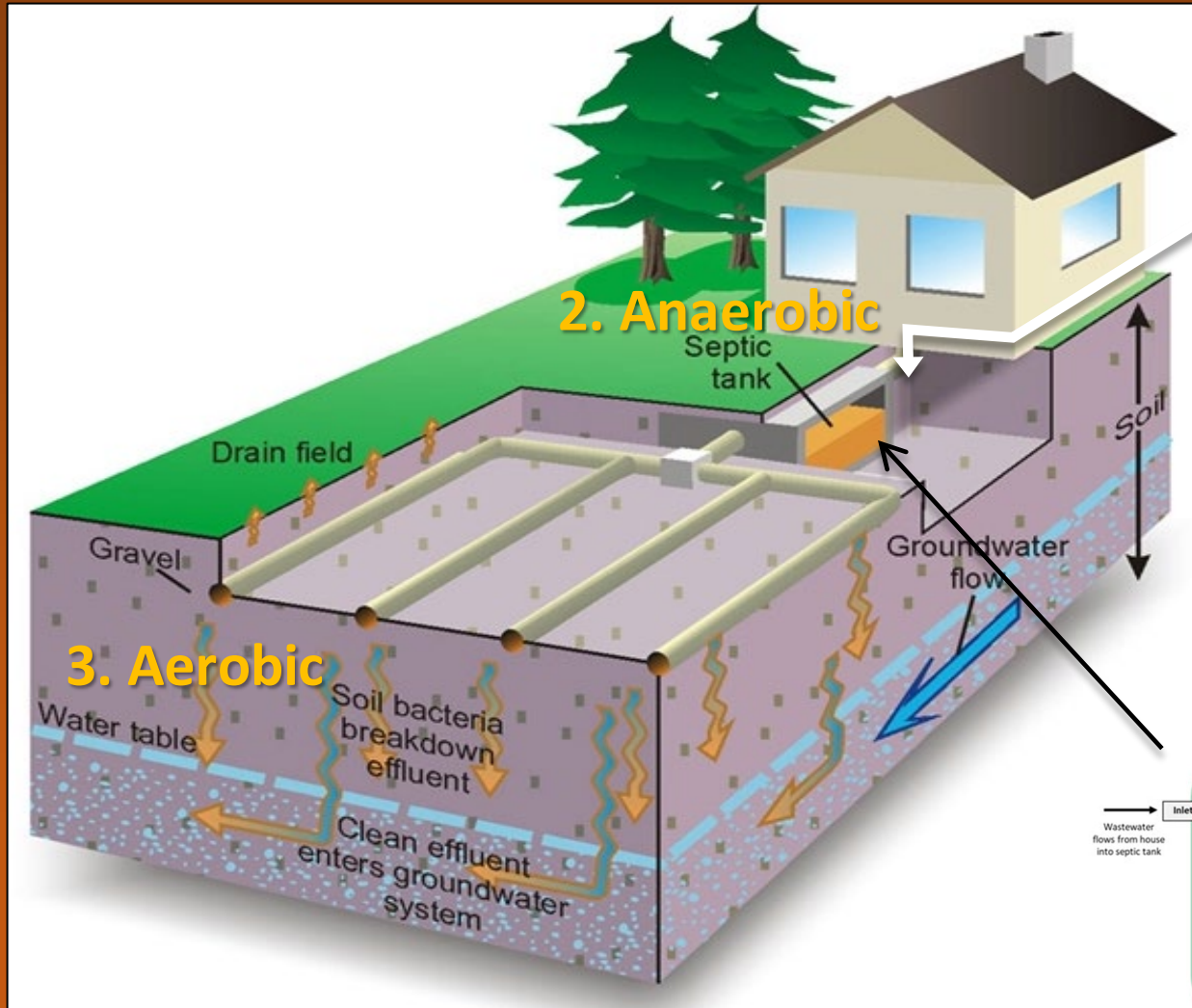
A reminder: How Soil-Based Wastewater Treatment Systems Work

Components:

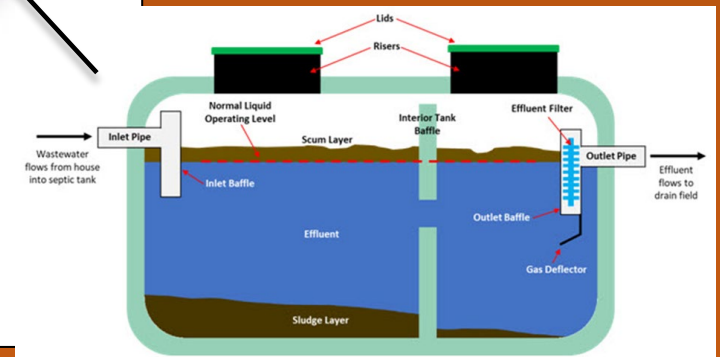
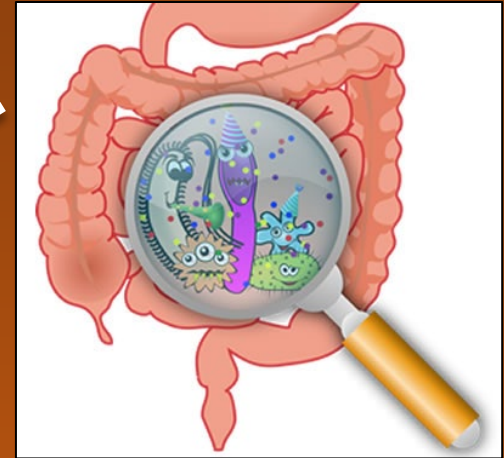
- Sanitary piping from the building to the septic tank
- **Septic Tank**
- Distribution Box & piping
- **Leachfield**
- **Natural On-site Soil**
- Innovative/Alternative Systems (IA)



How Soil-Based Wastewater Treatment Systems Work



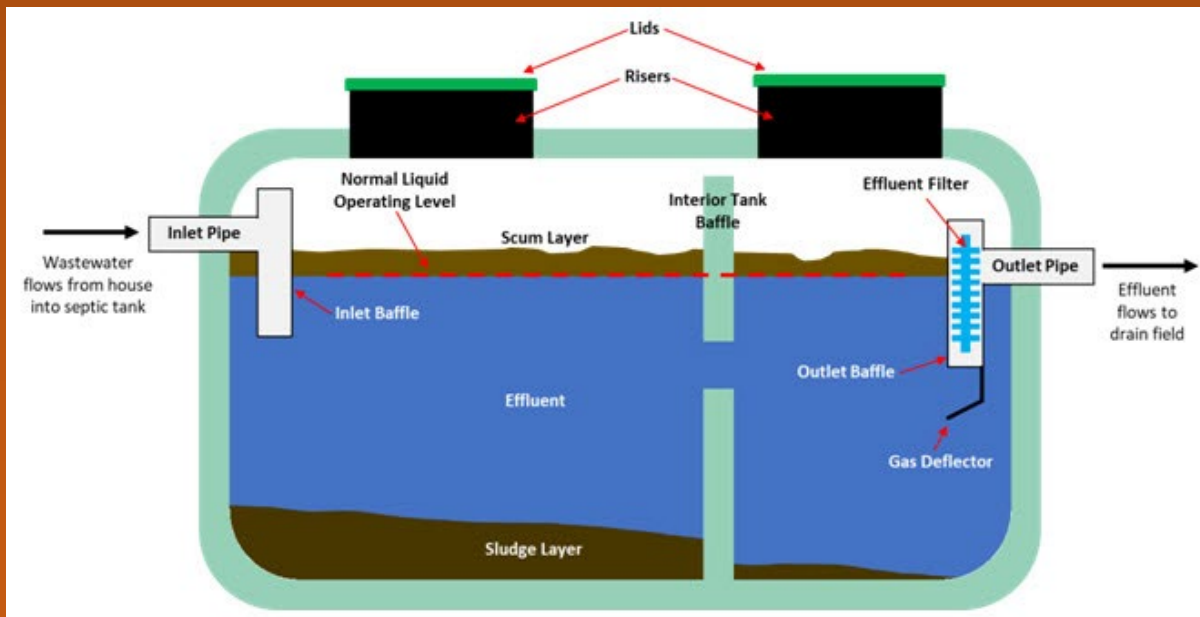
1. Digestion



How Soil-Based Wastewater Treatment Systems Work

Septic Tank

Solids held in tank. Anerobic bacteria break down the biosolids into basic components and biogas. Biogas is CO₂ and Methane.



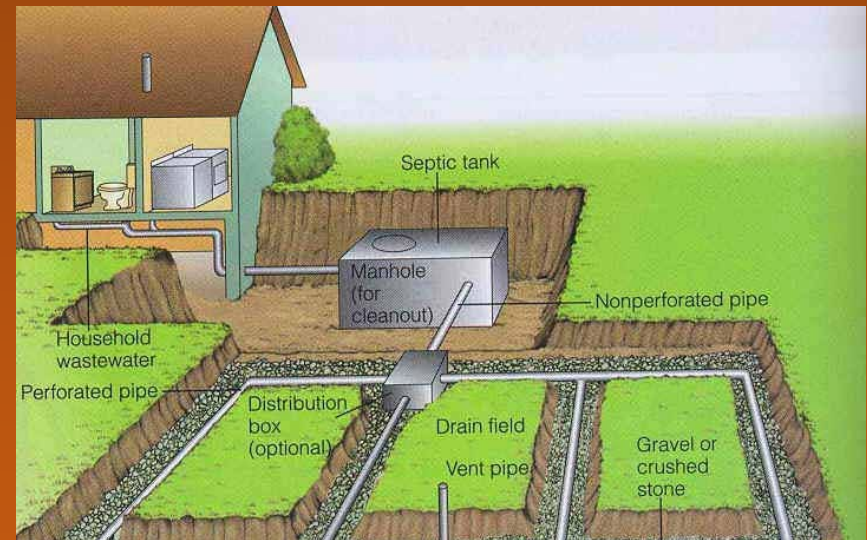
Biogas
=
“stink”

**Anerobic =
No Oxygen**

How Soil-Based Wastewater Treatment Systems Work

Traditional Leach field

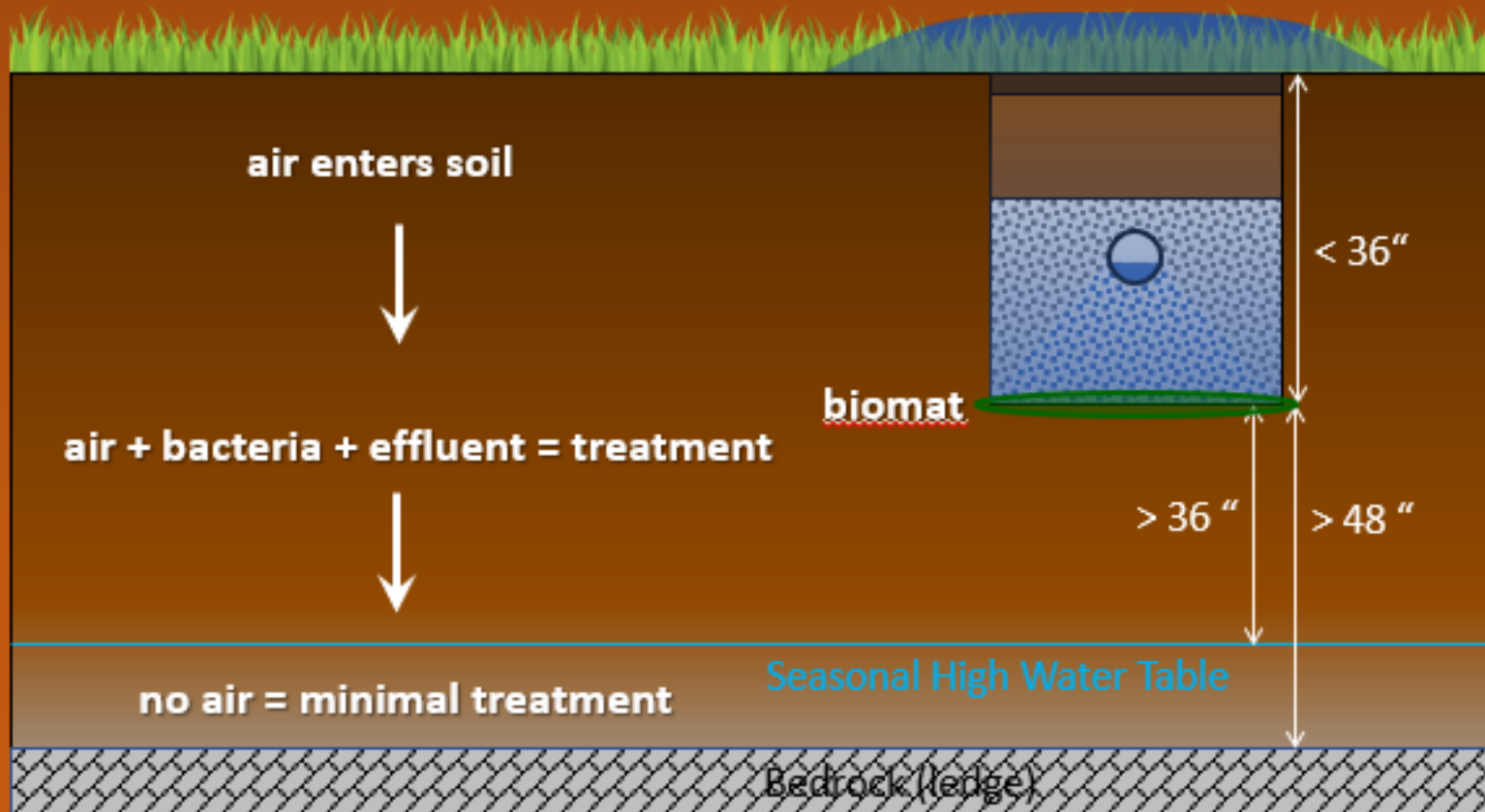
The pipes have small holes along their sides and bottom. As the wastewater flows through the pipes, it leaches into the gravel & sand. Bacteria (biomat or biofilm) digest the organic materials, purifying the wastewater before it enters the



How Soil-Based Wastewater Treatment Systems Work

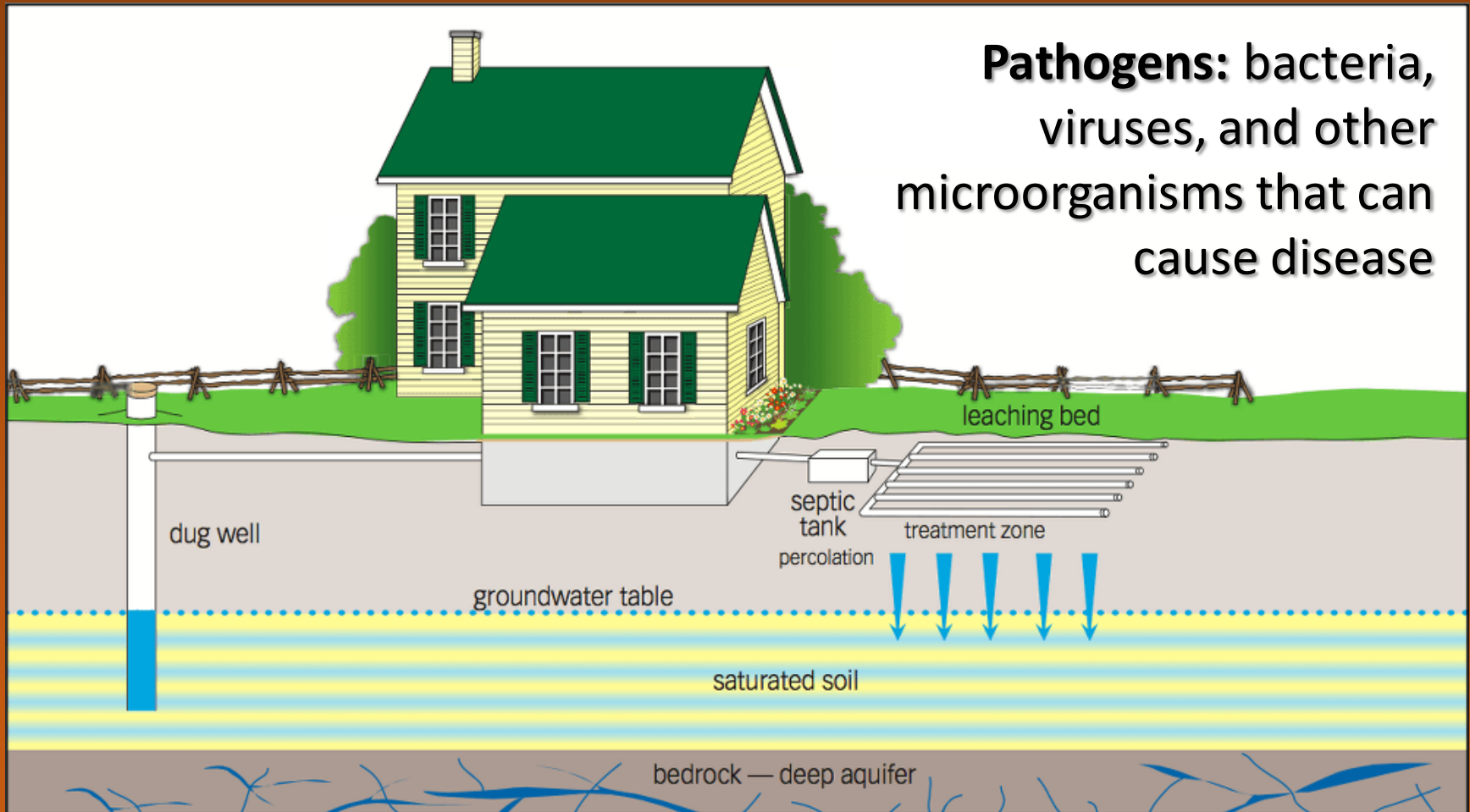
Natural Soil

Aerobic bacteria break down nutrients, leaving clean water



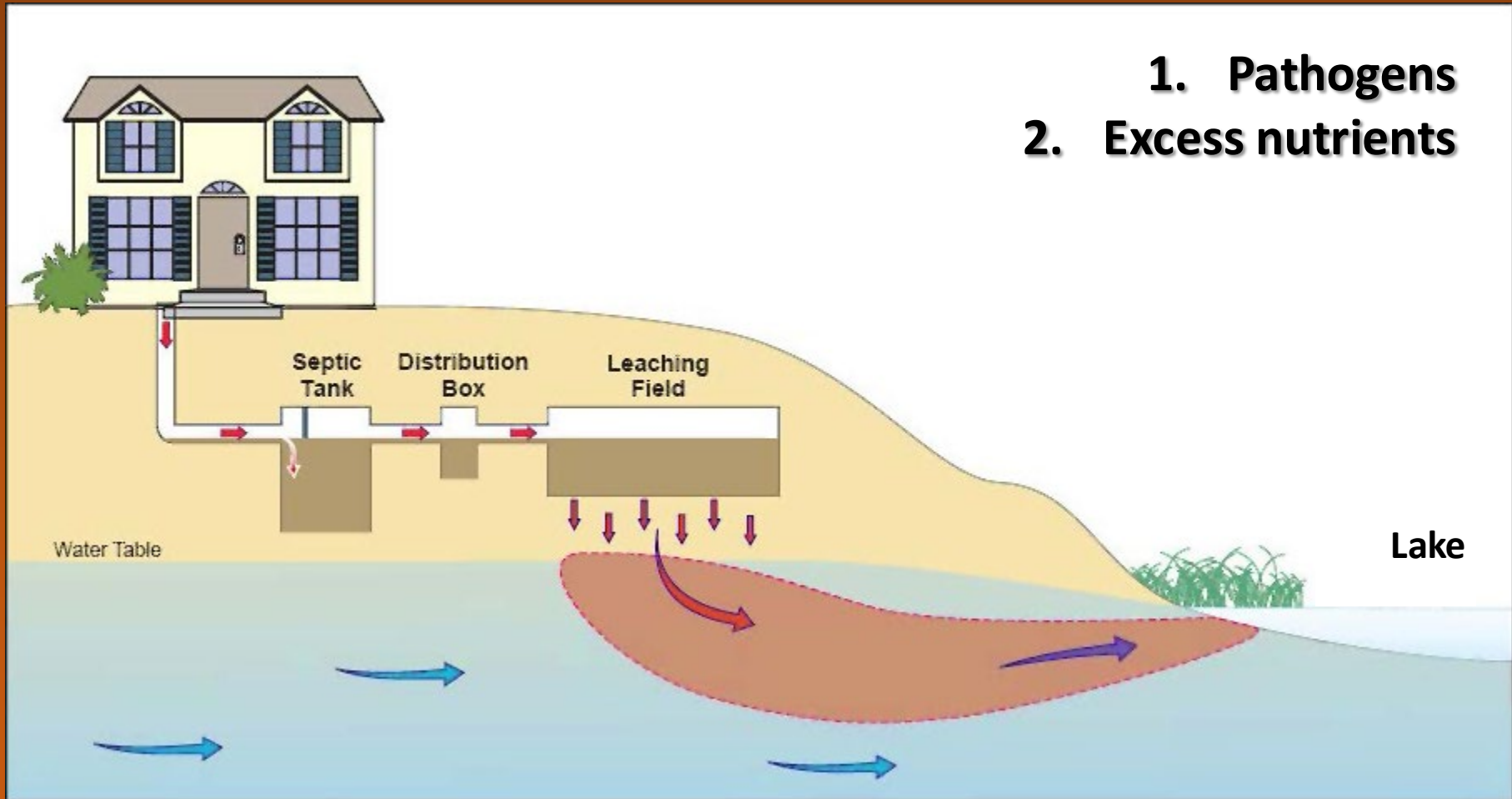
Why care about wastewater treatment?

Human Health



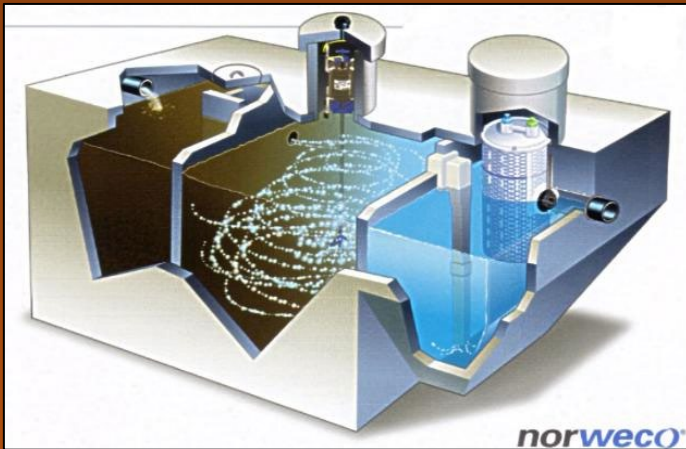
Why care about wastewater treatment?

Environment



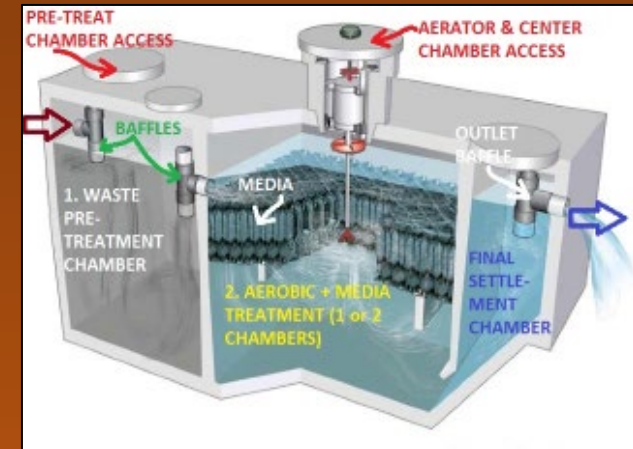
Innovative/Alternative Treatment Systems

1. Aerobic Treatment Units

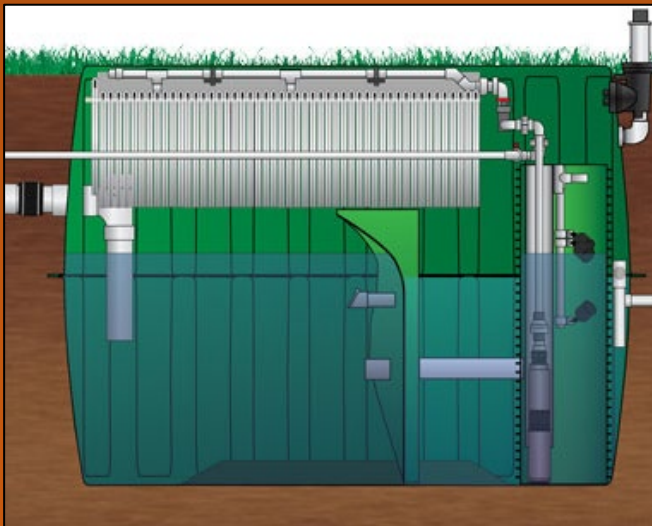


2. Media Filters

a) Bubbles up through synthetic media



b) Trickle down through synthetic media



c) Trickle down through organic media



Incinerating/Composting Toilets

- Allowed with a permit
- Composted Waste must be managed in accordance with permit:
 - Buried on-site
 - Landfilled
 - Sent to Wastewater Treatment Facility



When has a wastewater system failed?

When wastewater is:

1. Exposed on ground surface
2. Discharged to surface water
3. Backed up in building

* May qualify as a minor repair



A wastewater system may be malfunctioning but not failed if...

- It can be remedied by minor repair or replacement of physical component (s)
- Effects lasted for a brief period, system has recovered, and cause of failure was an unusual and non-recurring event (ex: Hurricane-caused flooding)



What you might see on a property

- Stinking or soggy area - a surfacing discharge
- Discharge into a ditch or a waterway
- Lush, very green area of grass
- Reports of drains backing up in the house
- Report of a contaminated water supply
- Visual & auditory alarms, foam coming from vents



A Failed System?

But is it really a failed system?

Or a Malfunctioning System?

Section § 1-201 (32) (B) of the WW Rules allow that a Failed System *shall not be a failed system if: (i) these effects can be and are remedied solely by a minor repair or minor replacement.*

Many systems can be repaired instead of being replaced

But is it really a failed system?

Or a Malfunctioning System?

Who they gonna call: Plumber, Excavating or wastewater service contractor, Licensed Designer (Short Sheet series)

Plumbers check & fix problems inside the house

Other contractors check & fix problems outside the house

Licensed Designers design & get permits for major repairs or a replacement of a failed wastewater system

But is it really a failed system?

Plumbing contractors can check & fix:

- Properly draining pipes from the toilet and sinks
- Clogged pipes or partially collapsed pipes heading outside the building
- Plugged vent pipes (may be on roof)
- Anything mistakenly tied into the septic system (sump pump, foundation drain, heat pump, floor drain)
- The septic tank to see if its full or leaking



But is it really a failed system?



An **excavating contractor** can check & fix:

- Pump not working correctly (if the system has a pump)
- Full or leaking septic tank or a clogged tank filter
- Malfunctioning distribution box
- Collapsed pipes
- Landscape changes that affect the leachfield



But is it really a failed system?

Plumbers are licensed in Vermont through the Department of Public Safety, Division of Fire Safety

Plumbing contractors do not have to be licensed plumbers to work on the plumbing in an owner-occupied single-family residence with its own water supply and wastewater system

Excavating & wastewater service contractors are not currently certified or licensed in Vermont

Seems to be a Failed System

If no easy fixes were identified and repaired, additional assessment will be necessary.

This will likely involve excavating a portion of the leachfield.



Excavating contractors cannot complete a major repair or replace a leachfield without a permit – contact a **Licensed Designer**

Seems to be a Failed System

Licensed Designers design & get permits for major repairs or a replacement of a failed wastewater system

Anything beyond a minor repair will require a permit from the *Vermont State Drinking Water and Groundwater Protection Program*



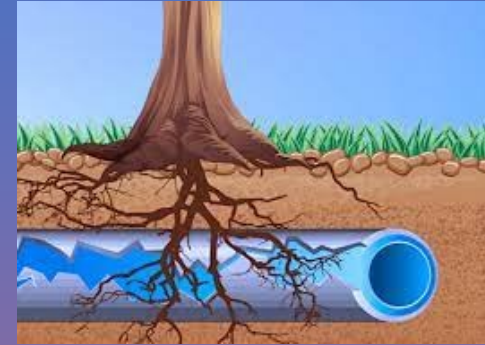
Seems to be a Failed System

A **licensed designer** will consider:

- The results from the contractor's inspection if available
- If the system has a permit: is the wastewater system installed correctly, in the specified location, and meets setbacks
- The type & location of the water source
- If the water use in the home has changed (in quantity or in quality)

Seems to be a Failed System

A **licensed designer** will also consider:



- The conditions surrounding the leachfield such as trees or shrubs, altered landscape drainage, or a compacted leachfield
- The conditions within the leachfield – correctly sized sand, presence of a biomat, high water table or flooding, impacts from roots or utility trenches.

Possible Wastewater Changes

Quantity or Quality

Quantity

Long or short term rentals
Teenagers or babies
New appliances
New home business
New home hobby
Connections from sumps,
drains, softeners, pool

Quality

Medical issues of residents
New home business
New home hobby
Increase in F.O.G.
Industrial/commercial
wastewater

Seems to be a Failed System

If the **Licensed Designer** indicates the need to replace the leachfield system, they can consider several options:

- Already approved replacement or alternate system
- Dual alternating leachfields
- Alternative wastewater disposal methods
- Approved IA Systems (See the ANR website for approved IA systems)
- New system, new location

Permit needed in almost all situations!

Hmmmm 'Variance'

If a Failed System cannot be repaired or replaced with a wastewater treatment system that complies with current Standards and Rules, the **Licensed Designer** can design a system requiring a **variance** from the Rules.

This means all alternatives have been examined and full compliance with the technical standard cannot be achieved at the home

Hmmmm 'Variance'

The **Licensed Designer** may work in consultation with a Regional Engineer to design a replacement system that can obtain variance approval

This approved replacement system must provide equal to or better protection to human health and the environment than the wastewater system it is replacing

Other Terms

- Isolation Distance
- Setbacks
- Well Shield & Septic Shield

Soil Texture:

- Silty Sand,
- Sandy Clay Loam
- & more

Notification: Septic Shield

'Overshadowing'

Perc Test

THO Role

- **Protect public health:** THO's role is to respond to complaints of malfunctioning or failing wastewater disposal systems to protect public health in their communities.
 - **Private issues:** If wastewater is backing up into a private (owner-occupied) home and is not surfacing on the ground outdoors or affecting public health, the THO may not have jurisdiction; this would be considered a private health hazard.
 - **Residential rentals:** The Rental Housing Health Code requires a properly operating subsurface wastewater disposal system that operates so sewage does not back up into the dwelling, flow to the ground surface or directly into surface water
- **Investigate:** When made aware of a sewage problem, a THO's first step is to immediately investigate.

THO Role

Seek voluntary compliance: If THO determines that a wastewater system is malfunctioning or failing and creating a public health risk or hazard, immediately seek voluntary compliance from the property owner (or responsible party) by sharing inspection findings and requesting that owner mitigate the public health risk:

- **Pump tank** within 24 hours, monitor, and pump again as necessary to avoid failing again until permanently repaired.
- **Spread lime and straw** and install temporary fencing around the area of surfacing sewage.
- If sewage back-up is inside, affected area should be **cleaned thoroughly and disinfected**. Plumber may be needed to “snake” the pipeline from the house to the septic tank.
- **Contact a plumber, professional engineer or licensed designer** to assess repairs necessary to correct the septic problems.

THO Role

- **Enforcement:** If owner (or responsible party) will not voluntarily comply with the THO's requests, the THO should initiate appropriate enforcement action.
 - If the THO determines that the wastewater or effluent presents an imminent and substantial significant public health risk, the THO should issue an emergency health order to ensure that the risk is mitigated.
 - The emergency health order should direct the owner to immediately address the situation and to take the actions we discussed in the previous slide
- **Notify town:** THOs should notify the town official responsible for enforcement of any septic ordinances (often this is the town sewage officer or the zoning officer) to ensure that the correct procedures and permits are acquired by the property owner. This individual would also be aware of any State requirements regarding permitting.
- **Notify Department of Environmental Conservation's Drinking Water and Groundwater Protection Division:**
 - Contact the regional office of the Department of Environmental Conservation for referral and assistance.
 - The environmental enforcement officer may be interested in performing a joint inspection with the THO or may decide to follow through on their own with the situation.

The Wastewater System and Potable Water Supply Rules



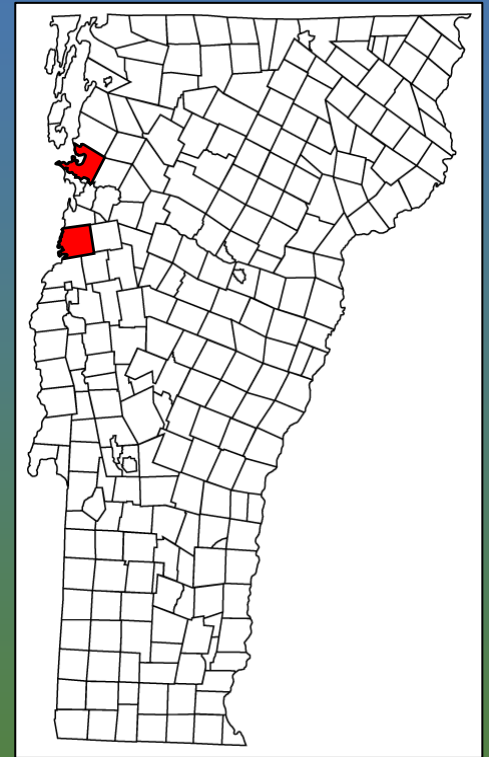
- Regulate **soil-based** disposal systems with design flow less than **6,500 gallons per day** and municipal connections to water & sewerage
- **Construction, modification, or replacement** of building, structure, campground, and associated **wastewater systems and potable water supplies**

Purpose of the Rules

1. Protect **human health** & the **environment**
2. Regulate **design, construction, modification, operation, & maintenance** of wastewater systems
3. Increase **accountability** of **designers & installers**
4. Ensure **owners** know **responsibilities** & have **knowledge** of system's design, operation & maintenance
5. Establish **performance criteria**
6. Encourage **innovation & flexibility** of design

Municipal Delegation

- From July 1, 2007, all Vermont land under the State's "Wastewater System and Potable Water Supply Rules"
- Municipalities may elect to receive delegation to issue State permits for:
 - on-site wastewater systems
 - potable water supplies, and
 - connections to municipal water & wastewater
- Municipalities that have delegation are Colchester and Charlotte.



Designer Licensing

- **Class 1 (Professional Engineers)** –all aspects of design, applications, certifications, and review for delegated municipalities.
- **Class A** – inground and at-grade systems
- **Class B** –inground, at-grade, mound, bottomless sand filters, with or without the inclusion of I/A Technology
- **Class BW**- same as Class B, but may design a water supply system that serves more than one structure



Finding a Designer

- **Office of Professional Regulation (OPR)** – Administer applications, renewals, complaints, and disciplinary action. Official lists can be found here:

<https://www.sec.state.vt.us/professional-regulation.aspx>

- **DWG WPD (ANR)** – Set exams and provide or endorse continuing education and training. Cannot recommend designers. Unofficial lists with contact information can be found here:

<http://dec.vermont.gov/water/licensed-designers>

Permit Application Requirements

1. **Design Flow** – gallons per day
2. **Soil Descriptions** – Where is water table? What is soil absorption capacity? Where is ledge?

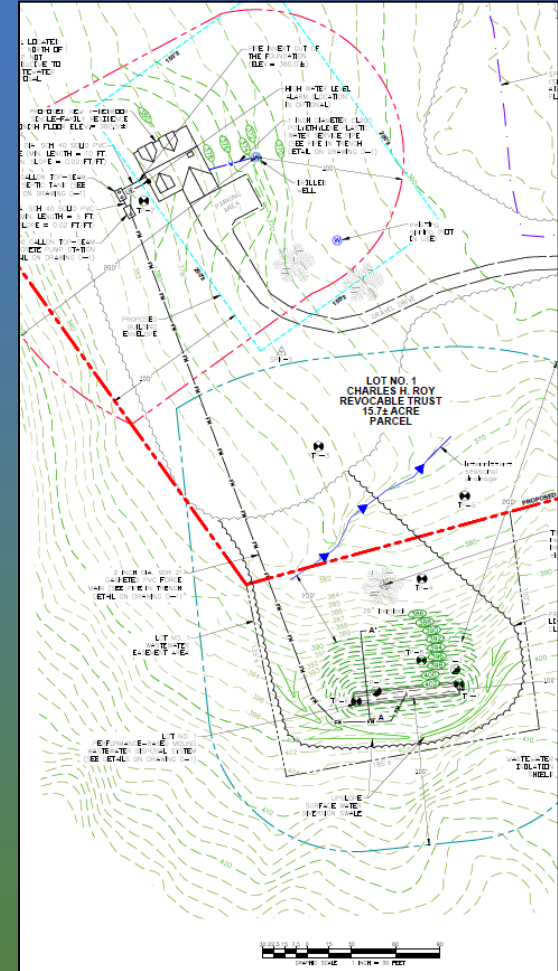


Permit Application Requirements

3. **Wastewater System Design** – Loading rates (gallons per square foot per day), system type, system size calculations, and component details

4. **Plans and Detailed Drawings** –

a) contours; b) water features; c) flood plain; d) engineered features; e) existing/approved wells & wastewater systems; f) easements or rights of way; g) test pit & well locations; h) construction details; i) isolation distances & presumptive zones.



Some Permit Reminders

- Permit runs with land. Enforceable against Landowner & Successors
- No permit is valid for a completed project until an Installation Certificate is received by DEC from the Licensed Designer

More Permit Reminders

- The Permit is only valid for conditions & system described in the Application
- As part of the permit, the landowner agrees to allow State representative to access property to ascertain compliance with Statutes, Rules, and Permit

Dates that matter

- **January 1st, 2007 – “Clean Slate”**
 - Wastewater systems & potable water supplies for associated buildings and campgrounds built before this date are exempt from Permit requirements provided there have been no modifications that alter flow
 - (“you get what you got, but you don’t get more without meeting the Rules”)

Dates that matter

- **July 1st, 2007** – Introduction of **Universal Jurisdiction**
 - After this date all Permits issued are by the State, unless authority delegated to municipality (Colchester & Charlotte)
 - Prior to this date, some Towns had their own regulatory requirements. Contact Town authority or Regional Engineer. It may still legally apply to the older systems.

DIY Wastewater Systems

- There are many DIY wastewater systems in VT: straight pipes, buried drums or tubs, dry wells. These may be pre 2007 & allowed if no flow modifications to the building use have been introduced.
- However, if the system is endangering human health or the environment, it is a failed system & needs to be replaced.



Potable Water Supply – Private Wells

- Permit is not required to replace a water supply for a single-family residence
 - Includes installing well to disconnect from municipal or shared supply
 - Documentation form must be recorded in land records



Homeowner Education – what to say

- Read and follow the *Homeowners Wastewater System* handout to maintain your septic system.



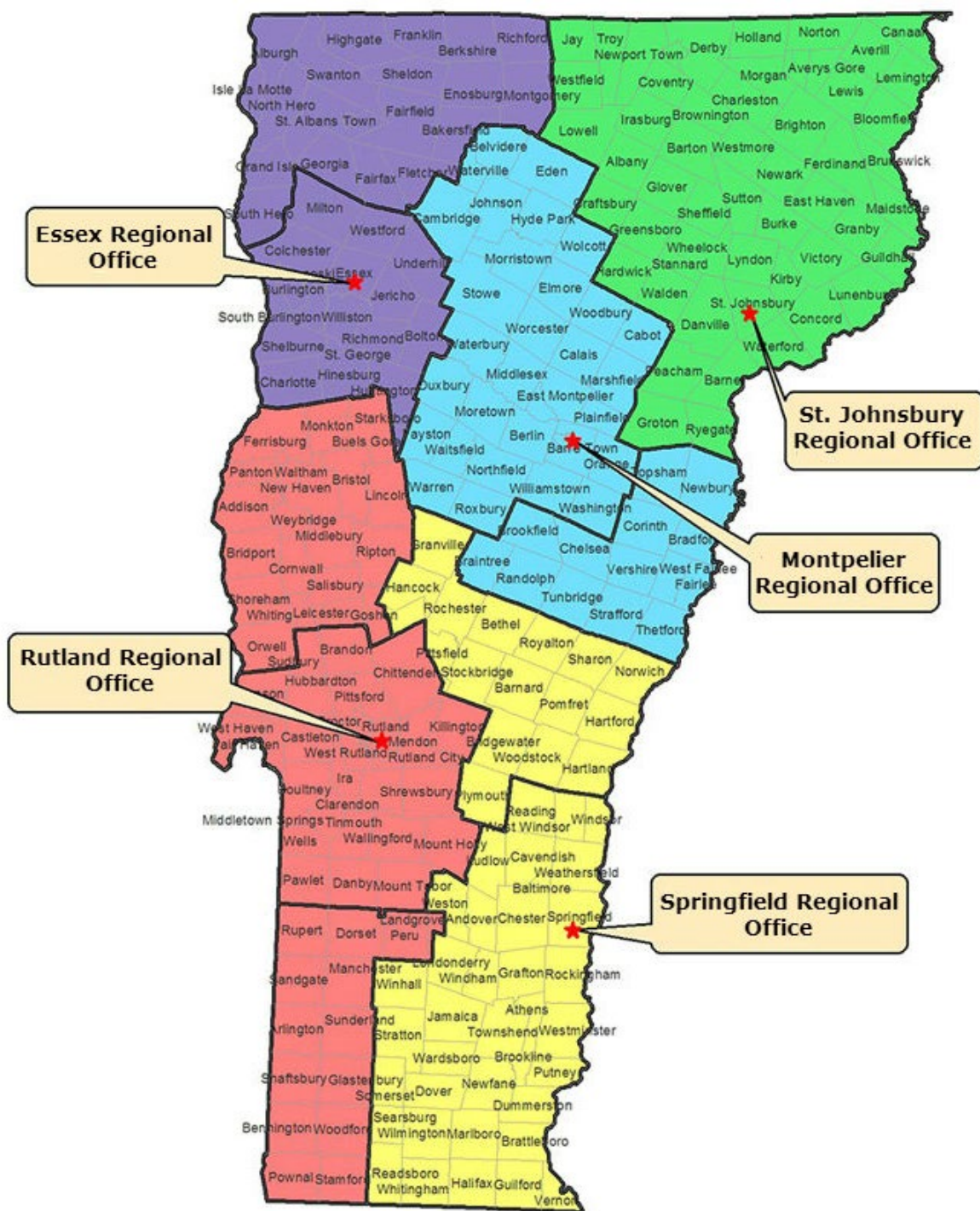
Be sure you know what maintenance is necessary for your system.

- Encourage good wastewater/water habits: don't overload your system or dispose of non-domestic wastes into your sinks or toilets.

Regional Office Program

<http://dec.vermont.gov/water/ww-systems>

<http://dec.vermont.gov/water/contacts>



Home

About DEC

Commissioner's Office

Administration and Innovation

Air Quality and Climate

Drinking Water and Groundwater

Drinking Water

Environmental Public Notices

Fees, Applications and Permits

Groundwater Reclassification

Groundwater Withdrawal Reporting and Permitting

Indirect Discharge

Laws and Regulations

Designer Licensing

Searchable Databases

Underground Injection Control (UIC)

Wastewater Systems and Potable Water Supplies

Permit Applications and Forms

Permit Compliance

Permit Guidance, Practices and Procedures

Program Education, Outreach and Resources

What Is a Septic System?

Permit Search

Program Rules

Innovative Alternative

Municipal Connections

Municipal Delegation

Technical Advisory Committee

Installer Program

Well Drillers Licensing and Reporting

Contacts

What's New

Environmental Assistance

1

2

3

4

PROGRAM EDUCATION, OUTREACH AND RESOURCES

This is a simplified overview of how a septic system works.

Water runs out of your house from one main drainage pipe into a septic tank.

The septic tank is a buried, water-tight container usually made of concrete, fiberglass or polyethylene. Its job is to hold the wastewater long enough to allow solids to settle down to the bottom (forming sludge), while the oil and grease floats to the top (as scum). Compartments and a T-shaped outlet prevent the sludge and scum from leaving the tank and traveling into the drainfield area.



The liquid wastewater then exits the tank into the drainfield. If the drainfield is overloaded with too much liquid, it will flood, causing sewage to flow to the ground surface or create backups in toilets and sinks.

Finally, the wastewater percolates into the soil, naturally removing harmful bacteria, viruses and nutrients.

The Regional Office Program issues [water/wastewater permits](#) (WW Permits) for soil based wastewater systems with flows of less than 6500 gallons per day, for potable water supplies (water supplies that are not public water supplies), and for municipal water and sewer connections. Permitting staff are located in five Regional Offices. Staff also administers the licensed designer program and reviews innovative and alternative systems for potential use in VT.

The [regional offices map](#) provides office, program and contact information for each region.

[Licensed Designer Program information.](#)

WHAT'S NEW?

[Be Septic Smart!](#)

Over half the households in Vermont depend on septic systems or other types of onsite systems to treat their wastewater. Failure to maintain a septic system can lead to backups and overflows, which can result in costly repairs.

Even if you do not own an on-site septic system you are likely to use one at a friend's house or camp, a business or a park facility. During Septic Smart Week, EPA provides septic system use and maintenance tips, including:

- **Keep it clean!** Maintain your septic system to protect the cleanliness of your water well.
- **Don't Strain Your Drain:** Use water efficiently and stagger use of water-based appliances. This can improve septic system operation and reduce risk of failure.
- **Think at the sink!** What goes down the drain has a big impact on your septic system.
- **Don't overload the commode!** A toilet is not a trash can. Disposable diapers and wipes, feminine hygiene products, cigarette butts and cat litter can damage septic systems.
- **Protect it and inspect it!** Regular septic maintenance can save homeowners thousands of dollars.



Where do I find answers to questions?

Digging deep into the DEC web site

<http://dec.vermont.gov/water/programs/ww-systems/program-education>

Where do I find answers to my questions?

1. The Designer may be able to answer questions
2. For WW Permit questions contact Regional Engineer
3. For compliance questions contact Compliance Manager:
Cristin Ashmankas – Cristin.Ashmankas@vermont.gov (802) 522-3257
4. If still unsure or unhappy, contact the DWGPD Program
Manager: Bruce Douglas Bruce.Douglas@Vermont.gov

Contacts

Cristin Ashmankas

Drinking Water and Groundwater Protection Division
Department of Environmental Conservation
Agency of Natural Resources

- Cristin.Ashmankas@vermont.gov 802-522-3257

Mary O'Leary

Drinking Water and Groundwater Protection Division
Vermont Technical College

Mary.Oleary@Vermont.gov

Mary.Oleary@vtc.edu 802-278-1343

Questions?

