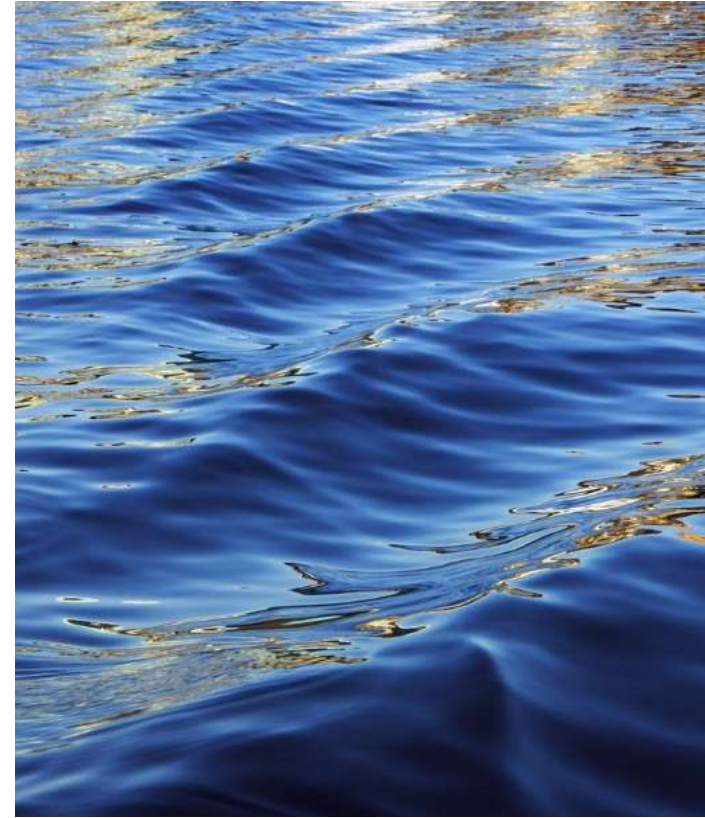


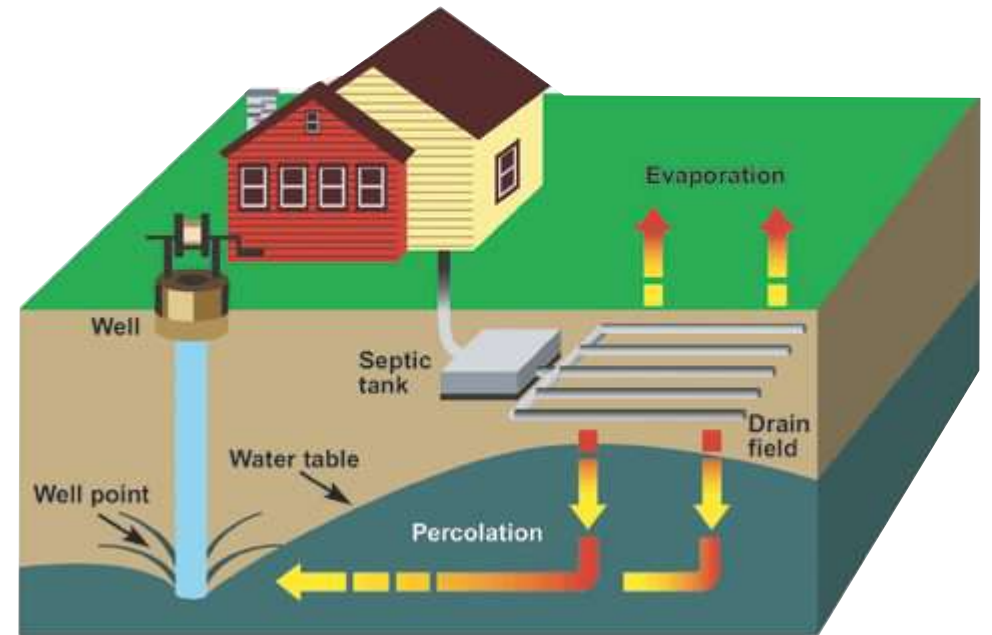
Septic Systems 101

Claire A. Golden, MassDEP
57th Annual Yankee Conference
Plymouth, MA
September 12, 2019



Topics to Be Discussed

- Wastewater Disposal History
- Disposal vs. Treatment with Dispersal
- Septic System Basics
- Advanced Treatment
- Keys to Maximizing Septic System Life
- Miscellaneous Issues
- Questions



A Few Notes Before We Proceed

- Any proprietary technology mentioned in this presentation is used purely as an example and its inclusion does not constitute a comment on or endorsement of the technology by the presenter or MassDEP.
- This presentation is intended to be general in scope but may, at time, refer back to 310 CMR 15.000, Title 5 of the Massachusetts State Environmental Code.
- Many municipalities have regulations that are more restrictive than the appropriate State Code.



Wastewater Disposal History



Wastewater Disposal to Surface Water



Resulted in the Clean Water Act (EPA)



Resulted in the Clean Waters Act (MA)

Wastewater Treatment Plants Resulted



**The same things were happening
in the on-site wastewater
disposal field...**

Initially it was “out of site...out of mind...”

(To Be Tacked Inside of the Privy and NOT Torn Down.)

Sanitary Privies Are Cheaper Than Coffins



For Health's Sake let's keep this Privy CLEAN. Bad privies (and no privies at all) are our greatest cause of Disease. Clean people or families will help us keep this place clean. It should be kept as clean as the house because it spreads more diseases.

*The User Must Keep
It Clean Inside. Wash
the Seat Occasionally*

How to Keep a Safe Privy:

- 1. Have the back perfectly screened against flies and animals.*
 - 2. Have a hinged door over the seat and keep it CLOSED when not in use.*
 - 3. Have a bucket beneath to catch the Excreta.*
 - 4. VENTILATE THE VAULT.*
 - 5. See that the privy is kept clean inside and out, or take the blame on yourself if some member of your family dies of Typhoid Fever.*
-

Some of the Diseases Spread by Filthy Privies:

Typhoid Fever, Bowel Troubles of Children, Dysenteries, Hookworms, Cholera, some Tuberculosis.

The Flies that You See in the Privy Will Soon Be in the Dining Room.


Walker County Board of Health




Cesspools



Privies Cesspits



Disposal vs. Treatment with Dispersal



Why Treat and then Disperse?

- Solids removal
- Grease/scum reduction
- Better sanitary conditions
- Less human contact with the wastewater
- An engineered leaching area which will provide pathogen reduction/removal

**Out of sight, out of mind is no longer sufficient.
So, exactly what is in wastewater?**

Wastewater Facts

Sources

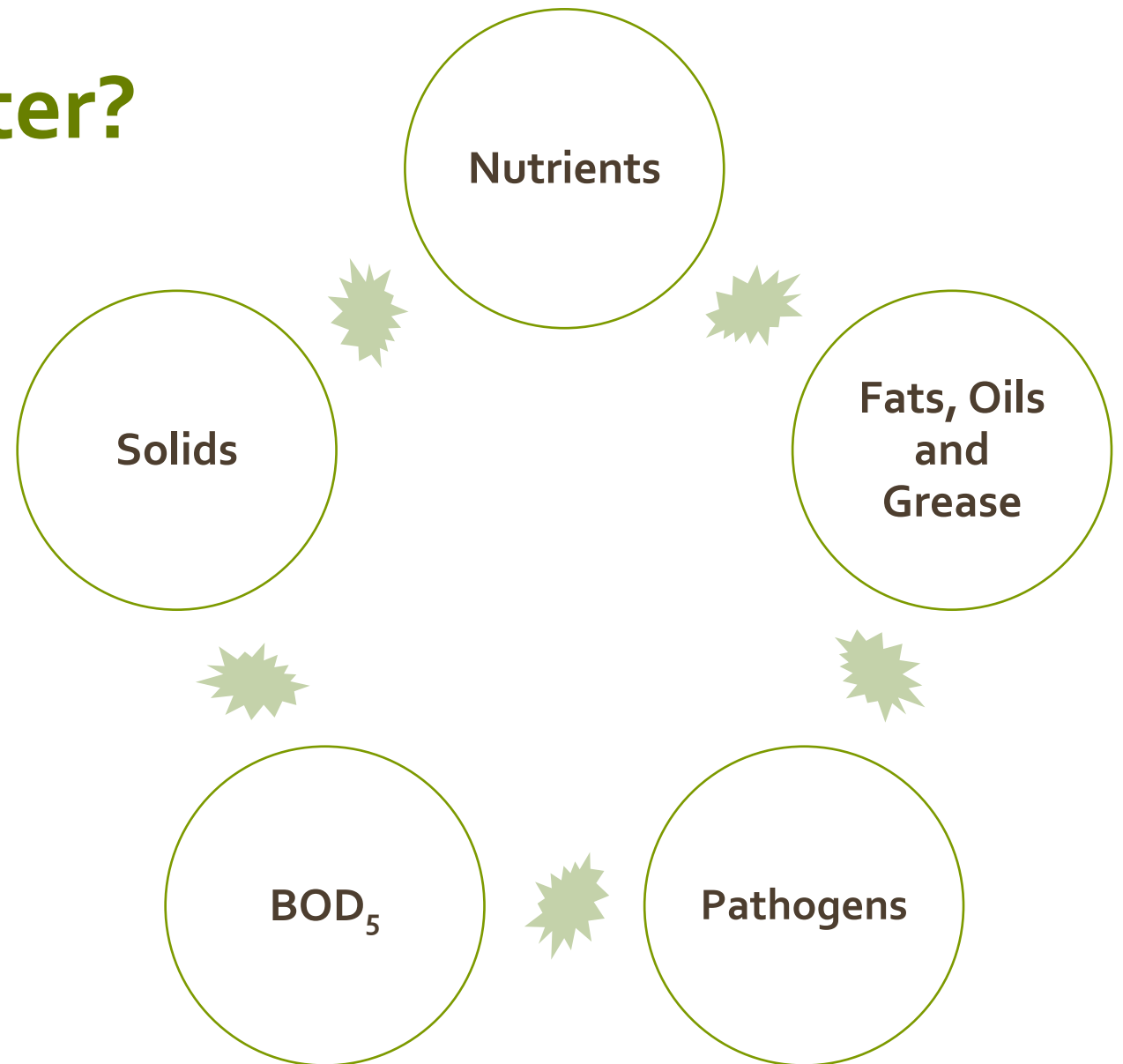
- Domestic
 - Residences
 - Institutions
 - Retail
 - Commercial
 - Offices
- Industrial

Types of Domestic

- Blackwater
 - Toilets
 - Kitchen Sinks
- Greywater
 - Showers/baths
 - Whirlpool tubs
 - Washing machines
 - Sinks other than kitchen

What's In Wastewater?

- Water (about 99%+)
- Nutrients
 - Nitrogen
 - Phosphorus
- Fats, Oils & Grease
 - Cooking oils
- Pathogens*
- Biochemical Oxygen Demand (BOD₅)
- Solids



Pathogens

- Bacteria
 - Salmonella
 - Typhoid
- Parasites
 - Protozoa
 - Giardia
 - Cryptosporidiosis
 - Roundworm
- Viruses
 - Hepatitis A
 - Gastroenteritis
 - Polio
- Fecal Coliform - indicator



Hepatitis A



Typhoid



Giardia



Cryptosporidium



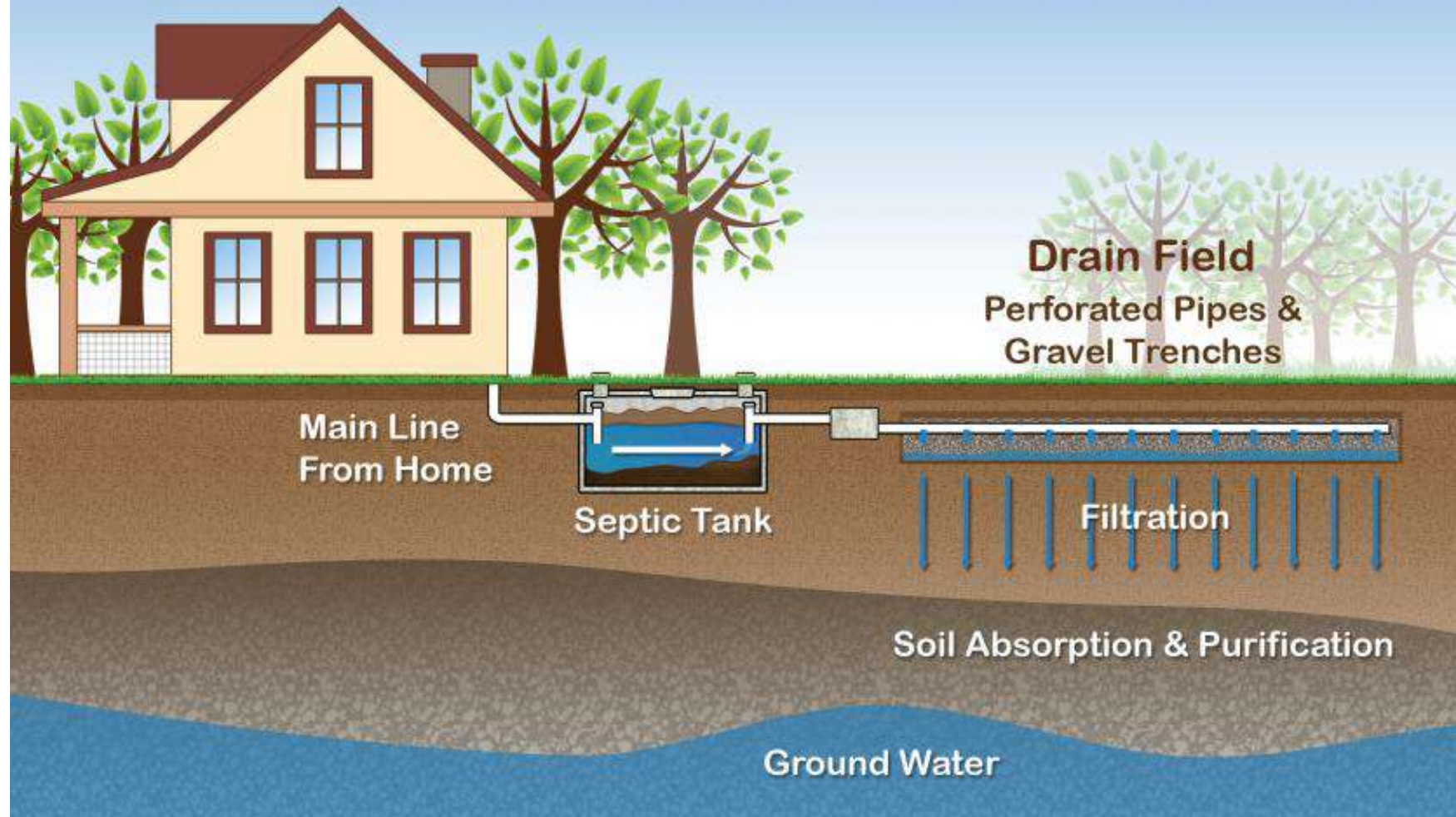
Conventional Septic Systems



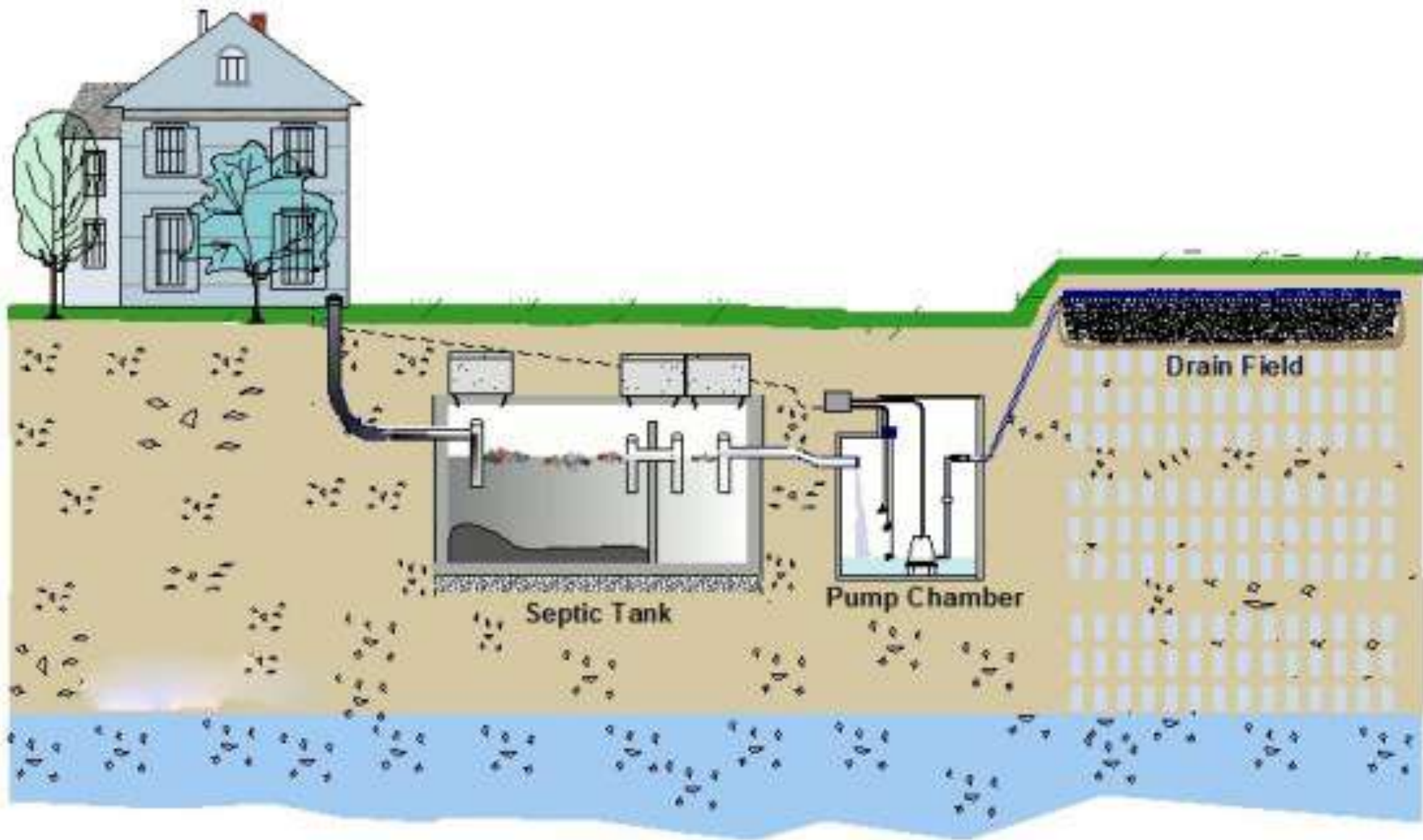
Conventional Septic System Components

- Grease Trap (optional)
 - Restaurants/Cafeterias
 - Nursing Homes/Hospitals/Schools
- Septic Tank
- Pump Chamber (optional)
 - Pressure dosing: Pump chamber to distribution box (elevation)
 - Pressure distribution: Pump chamber to leaching area
- Leaching Area, aka Soil Absorption System (SAS)
 - Engineered solution
 - Soils - a factor in design
 - Filtration and adhesion are provided

Conventional Septic System



Credit:
Minnesota Pollution
Control Agency

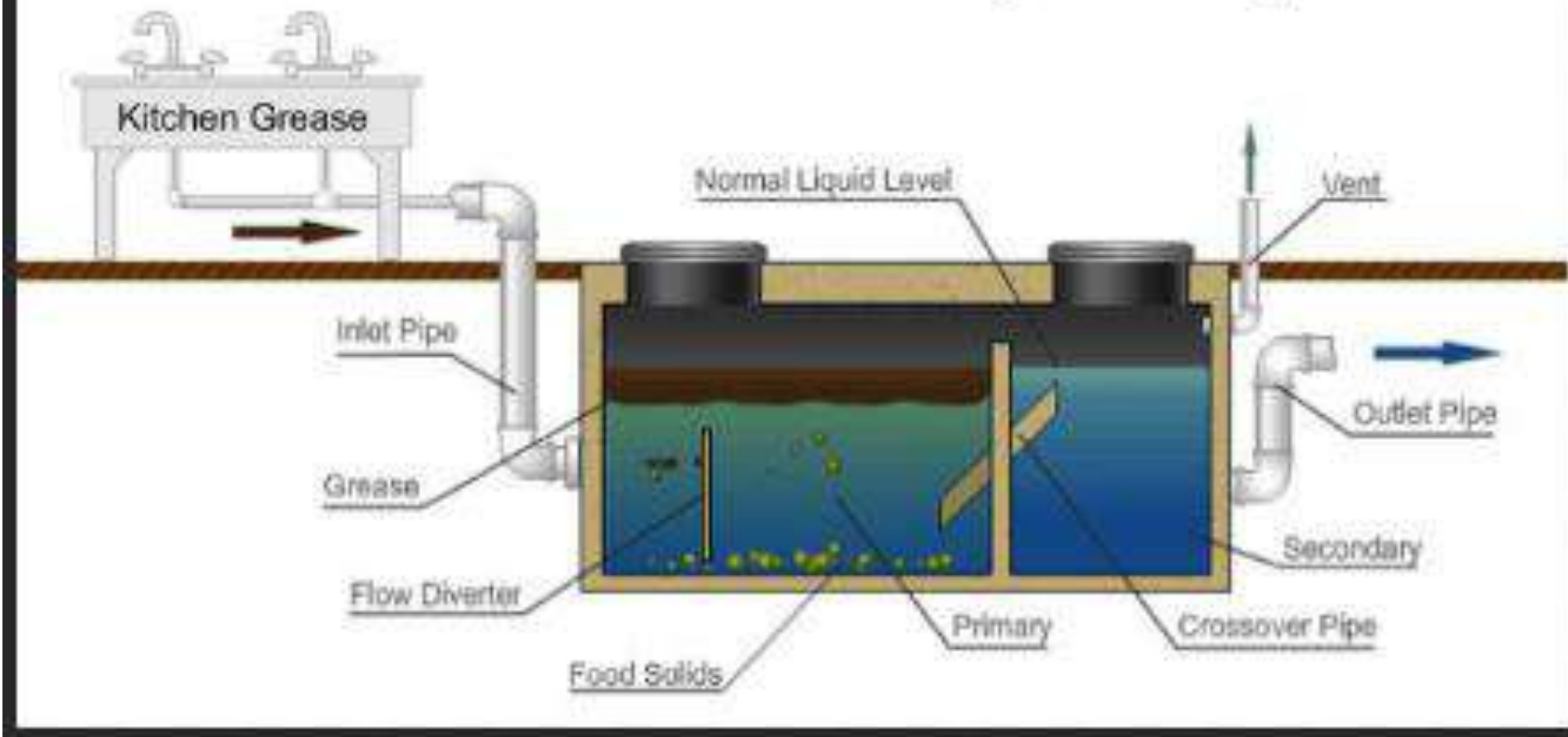


Credit: Groundstone, Canada

Grease Traps

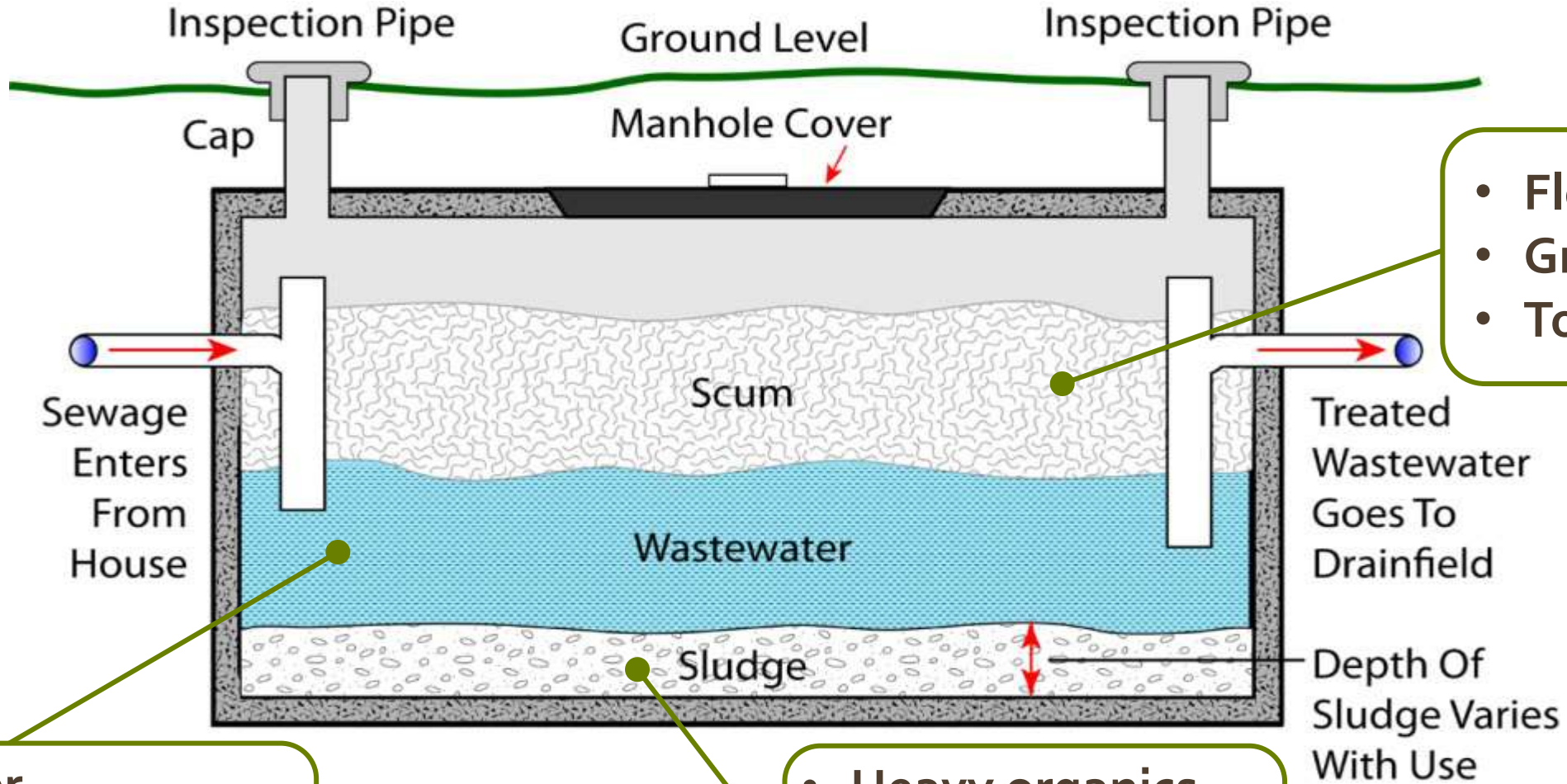
- Kitchen flows at restaurants, nursing homes, schools, hospitals, etc.
- Separate and external
- Under sink grease traps are an add-on
- Maintenance
- Specifications:
 - Material
 - Depth
 - Minimum Capacity
 - Detention time
 - Watertight
 - Tees
 - Access
 - Remote monitoring (optional)

How a grease trap works



Septic Tank Components

- Watertight tank (concrete, fiberglass, polyethylene);
- Inlet pipe with inlet tee;
- Outlet pipe with tee/filter;
- Center inspection port (MA - minimum 8-inch manhole); and
- Inlet/outlet manholes (MA - minimum 20 inches)



- Floating soap
- Grease
- Toilet paper

- Water
- Other liquid
- Suspended Solids

- Heavy organics
- Heavy inorganics
- Other solids

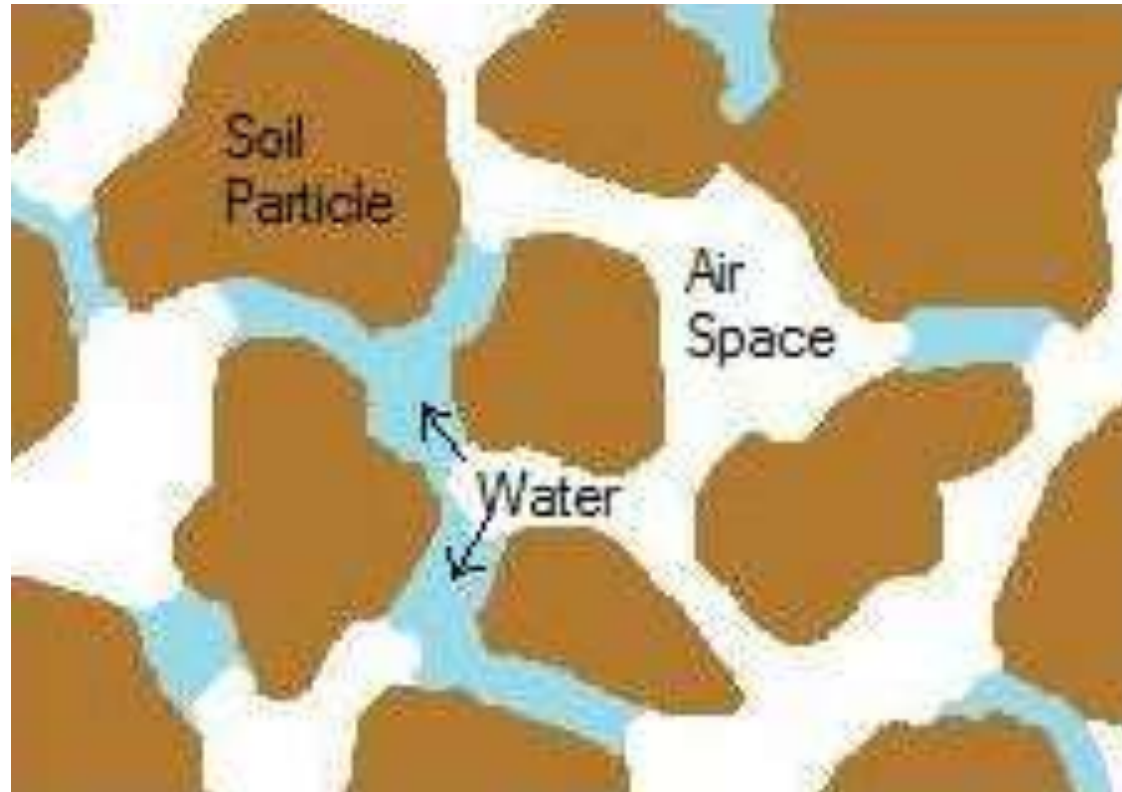
Distribution Box (d-box)

- Distributes effluent from the septic tank to the SAS

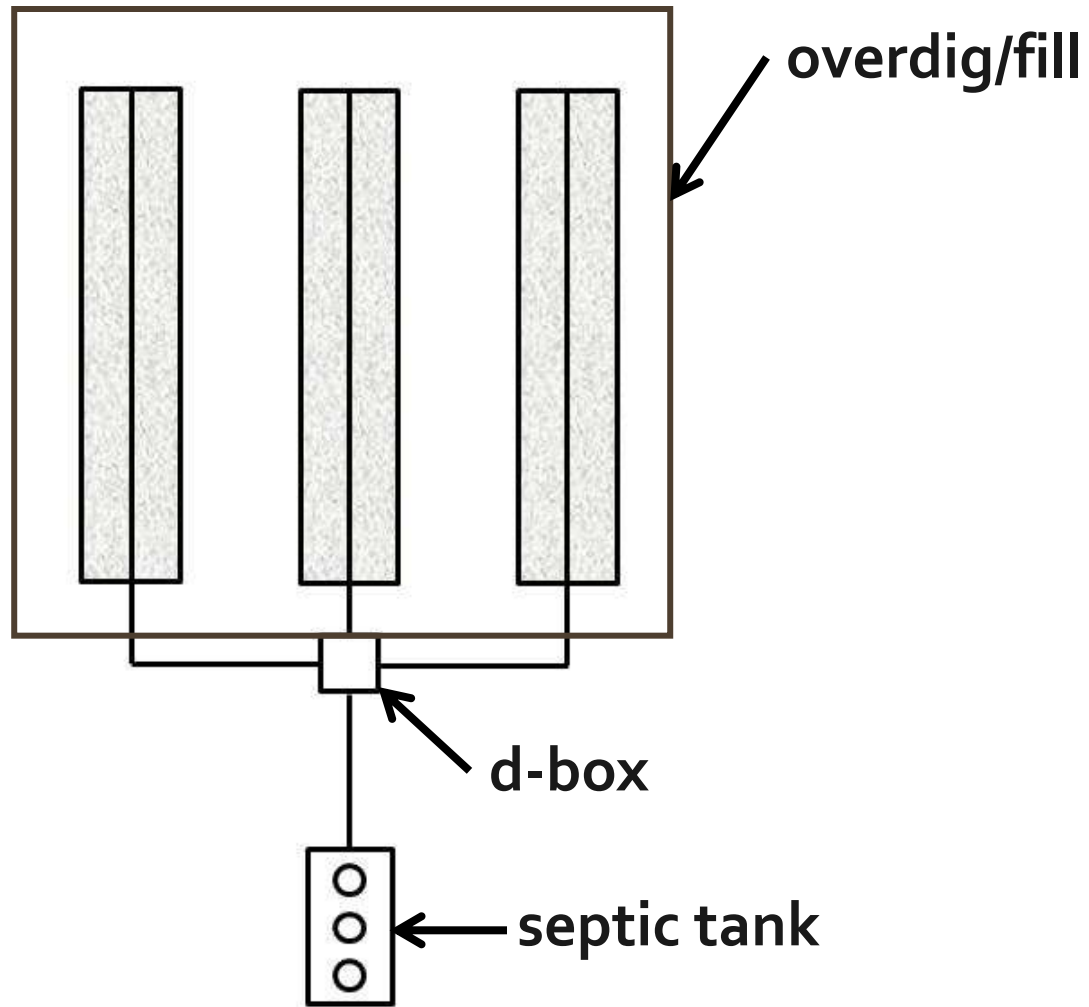


Soil Absorption System (“SAS”)

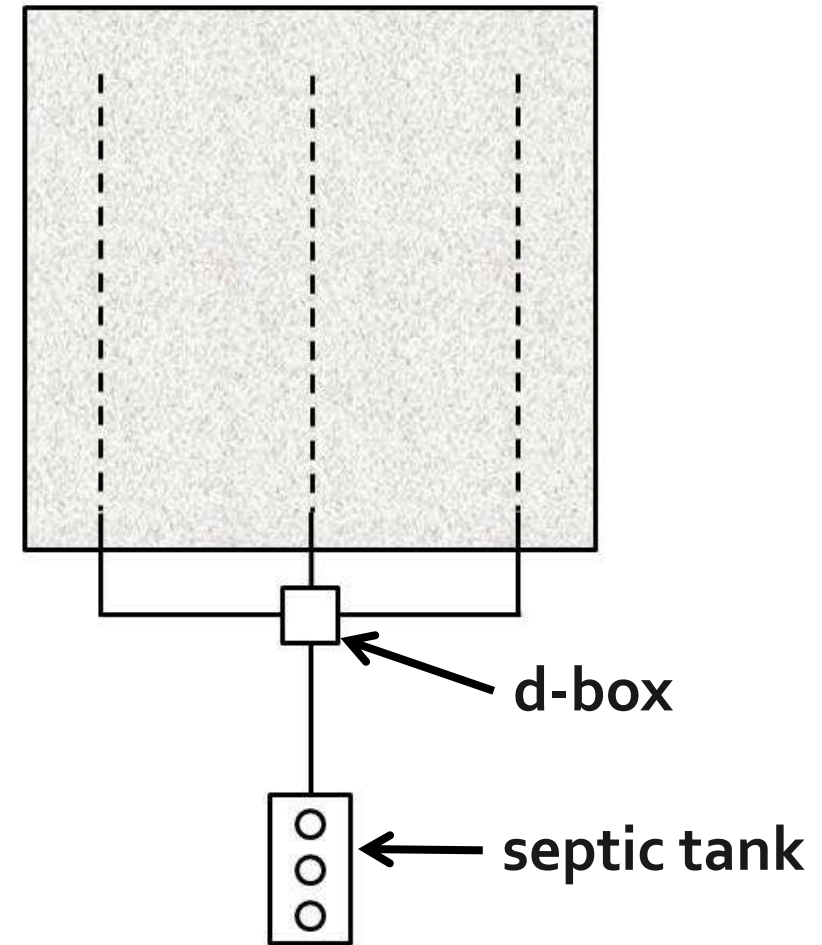
- Treats and disperses wastewater
- Various natural physical, chemical and biological processes
 - Filtering action
 - Bacterial action
 - Aerobic conditions



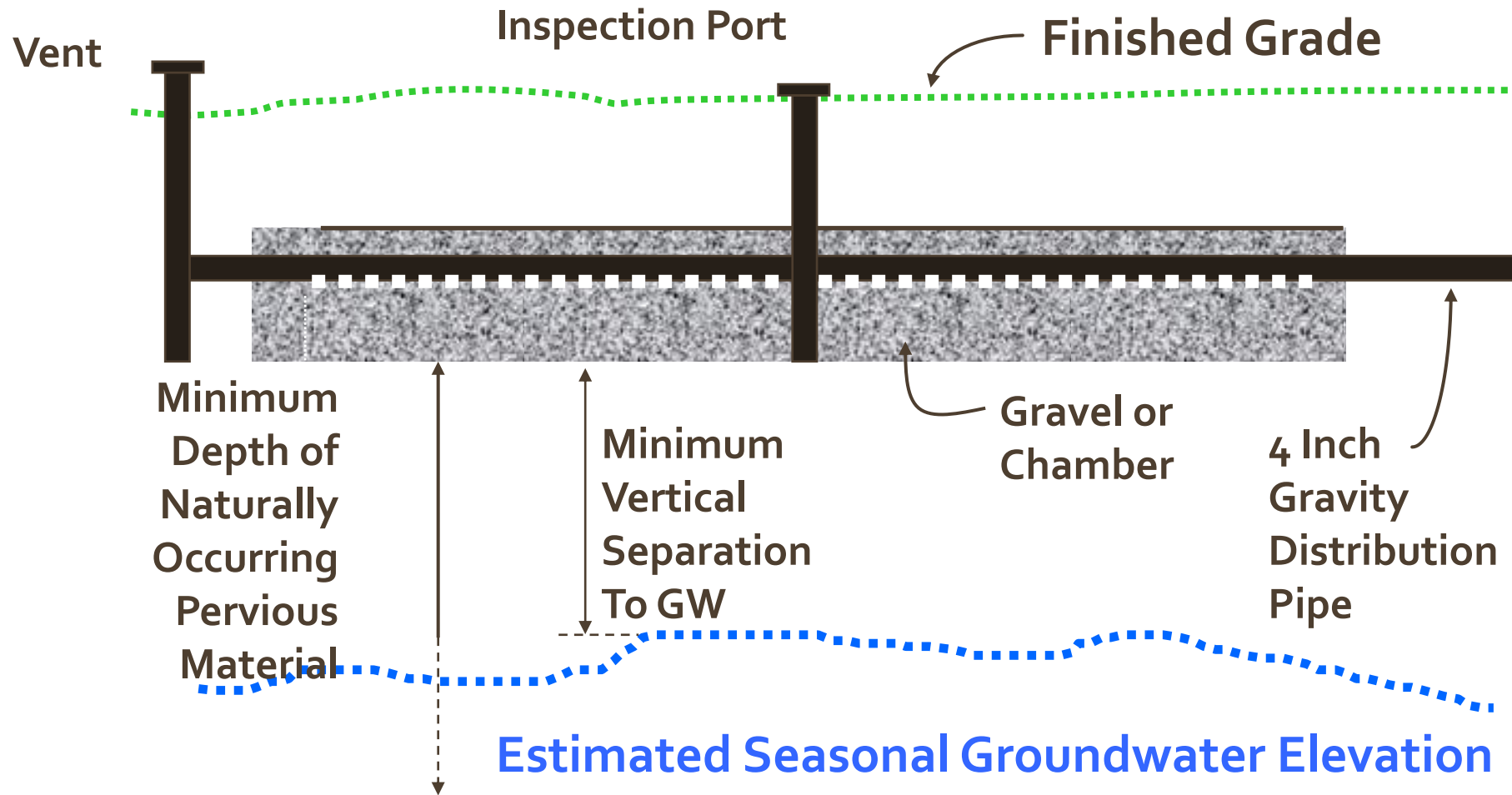
Credit: www.gibneyce.com




Leaching Trenches




Leaching Field/Bed





Nonconventional Septic Systems



Types of Nonconventional Septic Systems

- Tight tanks
- Greywater systems
- Shared systems
- Advanced Treatment Units
 - Innovative/alternative (“I/A”) technologies in MA
 - Secondary treatment units (“STUs”)
 - Advanced treatment units (“ATUs”)

Purpose of Advanced Treatment

If permitted under applicable regulations, nonconventional systems may be used for the following reasons:

- Site constraints for repairs
- SAS area reduction
- Nitrogen or phosphorus reduction
- Compensation for wetlands proximity

Nonconventional Treatment Technologies

- Proprietary
 - Micro-FAST/FAST
 - Bioclere
 - Advantex
 - Hoot
 - JET
 - RUCK
 - Singulair
 - Waterloo Biofilter
- Generic
 - Recirculating sand filters
 - Bottomless sand filters



Alternative SASs and Patented Sand Filters

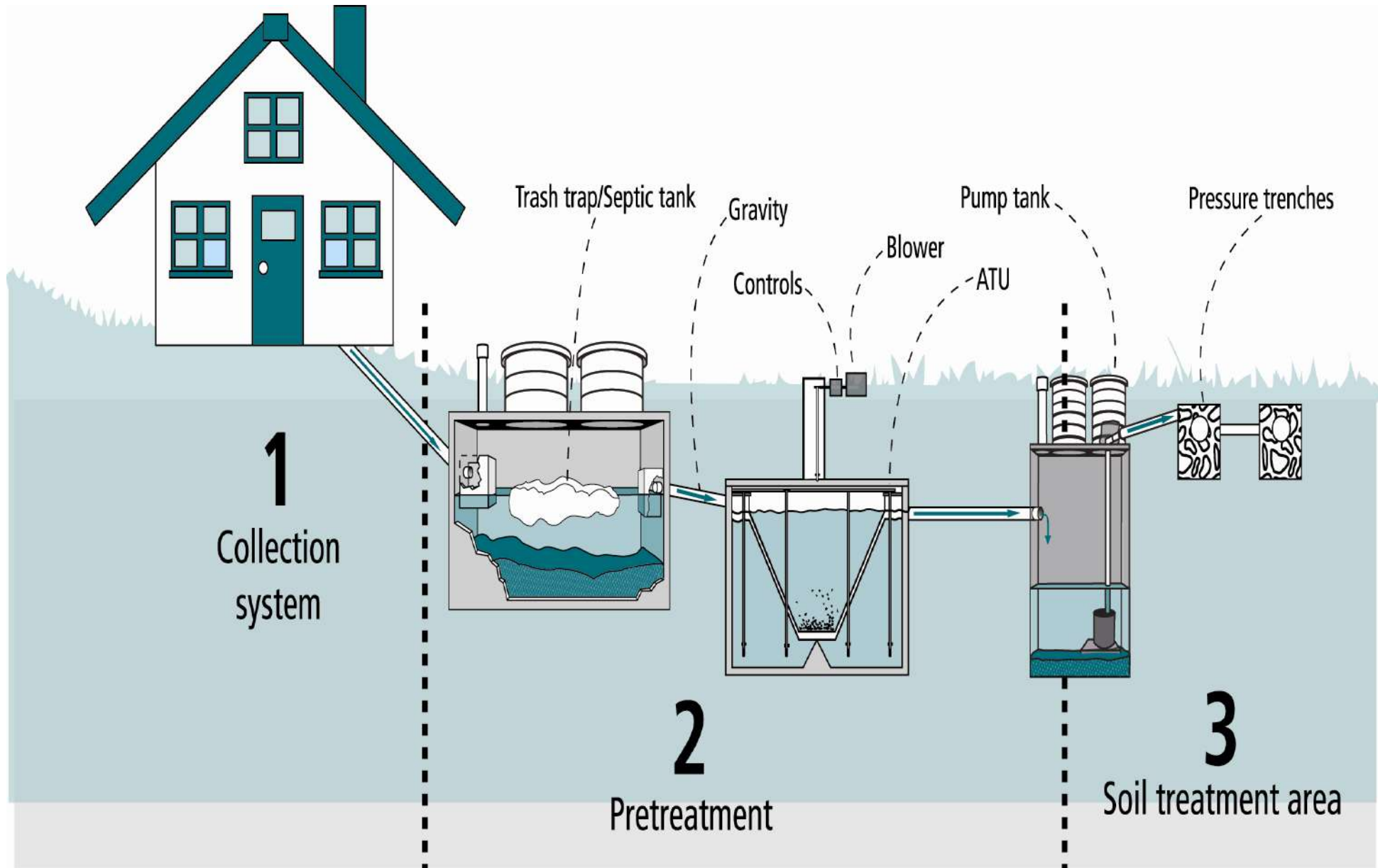
- Alternative SAS (including cham
 - Cultec
 - Infiltrator
 - Perc-Rite
- Patented sand filters
 - Presby
 - Eljen




Credit: Cultec




Credit: Perc-Rite

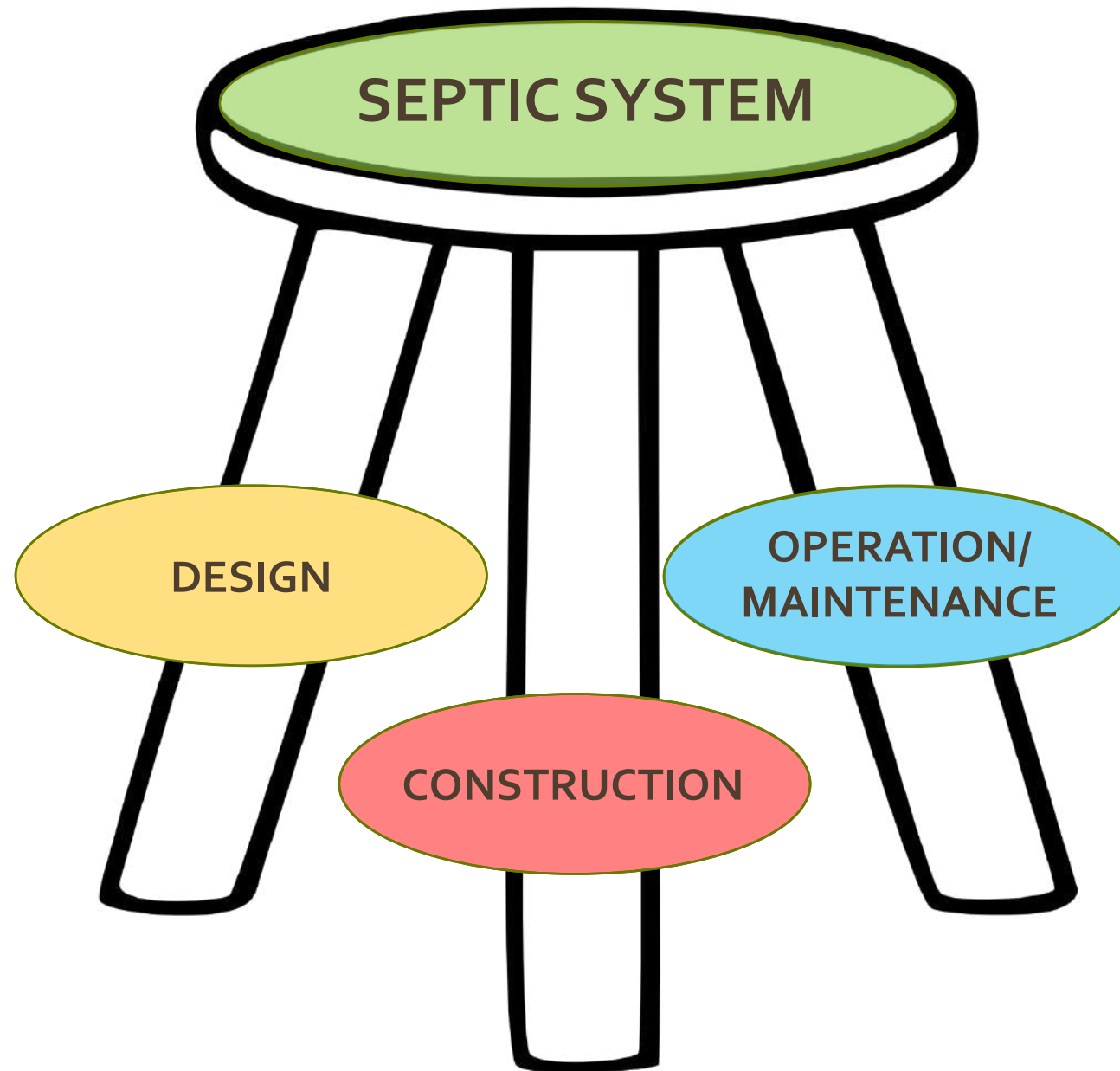


Credit: NOWRA A to Z Course



Keys to Maximizing Septic System Life







Miscellaneous Issues

Regulatory Considerations

- Approving Authority
- Setback distances
- Design flows
- Sizing
 - Concrete /plastic components
 - Soil absorption system
- Qualified designers
 - Soil evaluators?
- Qualified installers
- Operation and maintenance/Owner awareness and responsibility

Universal Guidelines Regardless of Your State

- Regulations can often be verbose and may be hard to comprehend.
- Accompanying policies, guidance and approvals can further complicate things.
- The enormity of the topic, whatever state you are from may seem overwhelming, but don't despair!
- You have resources!

When in Doubt, Take Advantage of:

- Knowledge and experience of co-workers or personnel from neighboring communities
 - Shadow them on site visits or in plan reviews
 - Some areas have quarterly meetings for the sharing of ideas/issues/problems
- Seminars and workshops to expand your knowledge base
- Websites and self-paced educational on-line tools
- Local/State resources
 - MA: Local Board of Health; and Regional MassDEP offices
 - CT: DPH and DEET
 - RI: DEM



Questions?

MassDEP REGIONAL CONTACTS

CERO

David Boyer	david.boyer@mass.gov	508-767-2823
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NERO

Wastewater Info Line		978-694-3215
Claire Golden	claire.golden@mass.gov	978-694-3244

SERO

Brian Dudley (Cape)	brian.dudley@mass.gov	781-946-2814
Brett Rowe (SE MA)	brett.rowe@mass.gov	781-946-2754

WERO

John Bourcier	john.bourcier@mass.gov	413-755-2112
Dan Kurpaska	daniel.kurpaska@mass.gov	413-755-2274
Matt Sokop	matthew.sokop@mass.gov	413-755-2218

Connecticut Septic System Contacts

- Advanced or alternative technology;
- Community system; and/or
- Any flows over 7,500 gpd

Michael Hart
CT DEEP

860-424-3819

michael.hart@ct.gov

- Conventional septic systems with flows up to 7,500 gpd

Robert W. Scully, P.E.
CT DPH

860-509-7296

robert.scully@ct.gov

Rhode Island Septic System Contacts

Jonathan Zwarg
RI DEM

401-222-4700, ext. 7205
jonathan.zwarg@dem.ri.gov

- Advanced or alternative technology

Brian Lafaille
RI DEM

401-222-4700, ext. 7731
brian.lafaille@dem.ri.gov



Thank you!