

# \* Wastewater Introduction

## Domestic Sewage

DPH  
Connecticut Department of Public Health  
Keeping Connecticut Healthy

# \* Domestic Sewage

Introduction and Sewage Overview Video  
<https://www.youtube.com/watch?v=U5-NUYcWXGg>

# DPH Domestic Sewage

- \* Water and human excretions
  - \* Toilets
  - \* Bathing water
  - \* Cooking and cleaning
  - \* Laundry
- \* Waste from restaurants and commercial buildings

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# DPH Pollutants in Domestic Sewage

- \* Suspended Solids
- \* Bio-chemical Oxygen Demand (BOD<sub>5</sub>)
- \* Total Nitrogen
- \* Total Phosphates
- \* Grease and Oils
- \* Coliform Bacteria

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# DPH Bio-Chemical Oxygen Demand

- \* BOD
- \* measure of the amount of bio-degradable organic chemicals in the wastes
- \* High BOD = strong waste
- \* Low BOD = weak waste

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# DPH \* Bio-Chemical Oxygen Demand

- \* Properly functioning septic tank will reduce the BOD in the effluent by about 25 to 30 percent (more with a two compartment tank)
- \* Further reduction occurs when the effluent comes in contact with bacterial growth in the leaching system (biomat)
- \* Amount of reduction depends on the volume of bacterial growth in the leaching system

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## \* Nitrogen

- \* Hazardous to infant children (methemoglobinemia or "blue baby disease")
- \* Septic systems remove approximately 30% of total nitrogen with the remaining 70% being discharged to the groundwater.
- \* Separation distances to wells must be maintained.

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## \* Phosphate

- \* Stimulates plant growth (lush green grass or algae growth in surface water)
- \* Algae blooms
- \* Readily removed by filtration through only a foot or two of most CT soil types




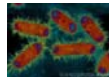
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**DPH** \* **Coliform Bacteria**

- \* indigenous to the digestive tract of humans and warm-blooded animals
- may not be harmful themselves, but indicates that pathogenic organisms and / or viruses may be present
- viruses are smaller than bacteria and not as easily filtered out

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**DPH** **Chemical Pollutants in Sewage**

- \* Paints, solvents, refinishing agents, cleaning chemicals, chlorinated hydrocarbons, etc.
- \* Considered to be hazardous chemicals since they can readily pass thru a septic system and enter the groundwater
- \* Amount of these chemicals in domestic sewage should be extremely small

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**DPH** \* **Non-Typical Domestic Sewage**

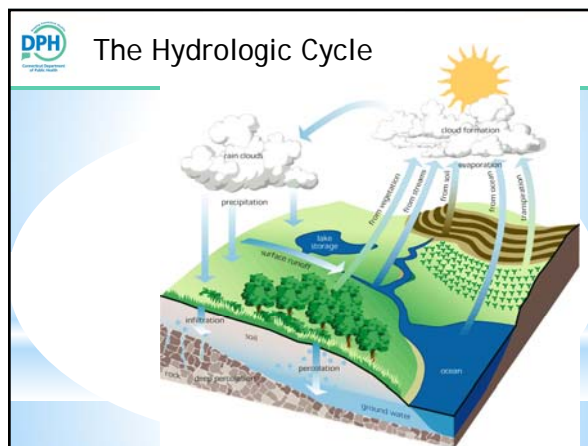
- \* Kitchen wastes - extremely high in grease
- \* Wastes from garbage disposal systems contain large amounts of settleable solids and therefore the septic tank should be pumped more frequently
- \* Laundry wastes high in phosphates, clothing fibers, oils and bacteria shed from the body

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**DPH** \* **Why A Septic System?**


- \* Septics vs Sewers
  - \* Low density - towns wish to remain rural
  - \* Sewers too costly in rural areas
  - \* The goal - avoid groundwater pollution
  - \* Typically cause less pollution
  - \* Cost effective with proper maintenance

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**DPH** \* **How we dispose sewage?**

\*Where does it go?



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**DPH** **Methods of Sewage Disposal**

- \*Public Sewers
- \*Conventional "Septic Systems"
- \*Alternative or Advanced Treatment Systems

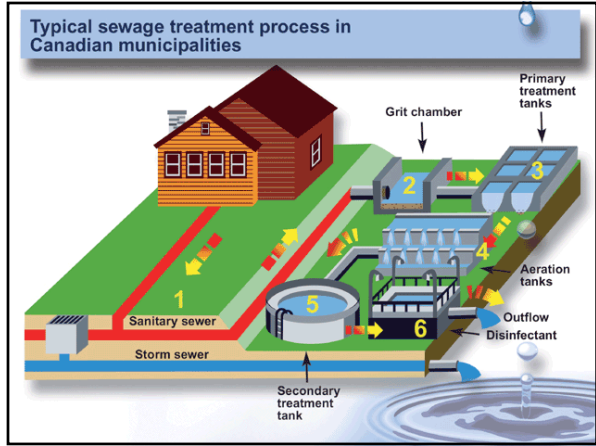
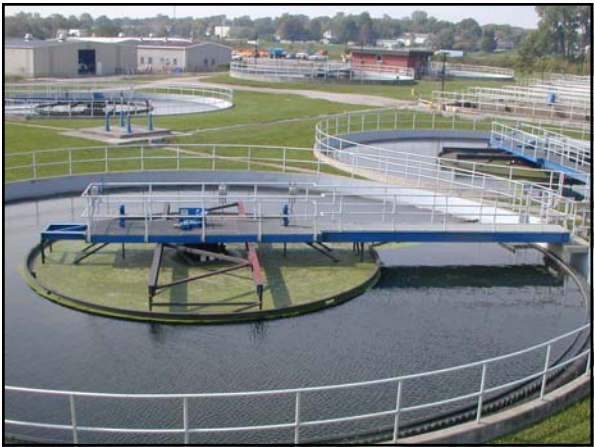
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**DPH** \* **Public Sewers**

- \*Serves approximately 60 percent of the CT population
- \*Predominantly in urban areas and areas of high density development

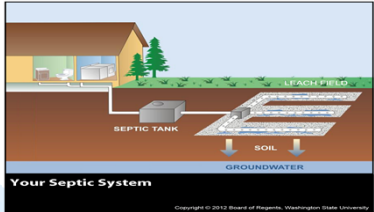



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**DPH** **Conventional Septic Systems**

- \*Serve approximately 1 million people in CT
- \*Defined as Subsurface Sewage Disposal Systems in CT regulations
- \*Soil based treatment and dispersal



**Your Septic System**

SEPTIC TANK  
LEACH FIELD  
SOIL  
GROUNDWATER

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**DPH \* DEEP Systems**

- \* Requires DEEP permit
- \* Alternative or Advanced Treatment Systems
- \* Community Systems
- \* Large Conventional over 7,500 GPD
- \* Reg. 19-13-104

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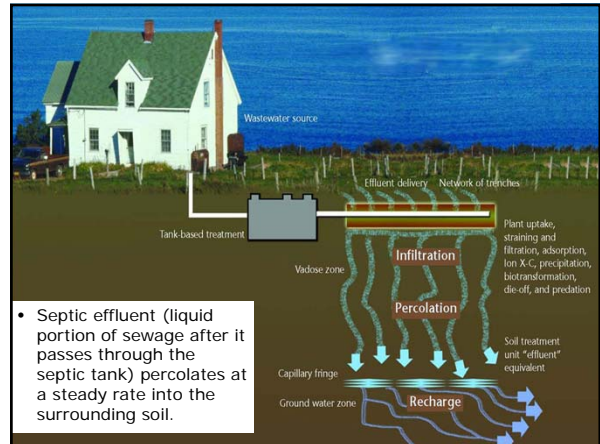
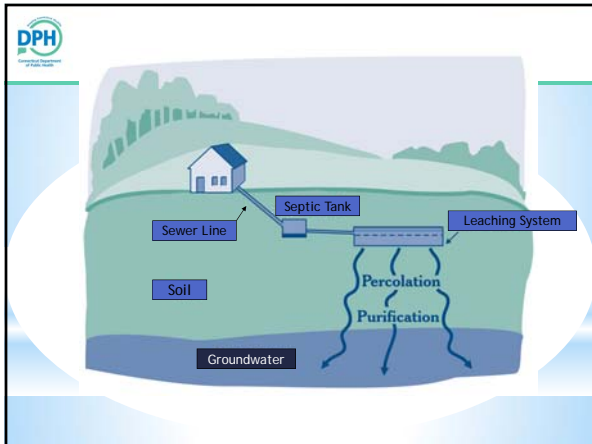
**DPH \* Septic Systems**

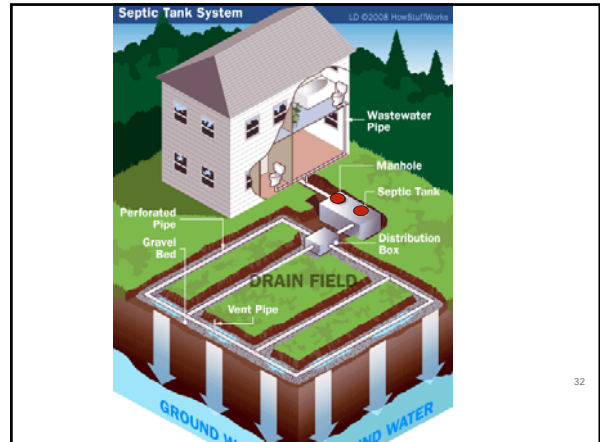
For many communities On-site Sewage Disposal via a Subsurface Sewage Disposal System a.k.a. septic system, is the only option for sewage treatment and disposal.

**DPH \* What is a Septic System?**

- \* Building Sewer
- \* Septic Tank
- \* Distribution Piping
- \* Leaching System
- \* Necessary pumps, grease traps and groundwater control systems

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**DPH** **How Does a Septic System Work?**

“The source of wastewater is the domestic water used in homes, schools or businesses that the treatment system serves. Domestic wastewater is water discharged from plumbing fixtures, appliances, toilets, baths, laundry and the dishwasher. Wastewater is typically 99.9% liquid.”

<http://www.gbra.org/septic.swf>

**DPH** **How is a septic system sized?**

- \* Residential buildings
- \* Number of bedrooms
- \* Commercial and non-residential buildings
- \* Actual flow, times a factor of safety
- \* Design flow table

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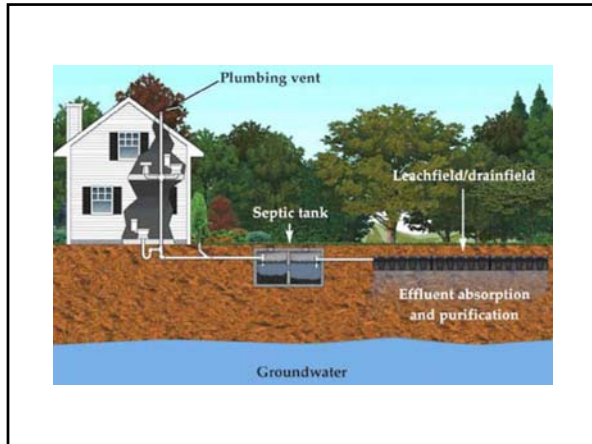
**DPH** **\* Building or House Sewer**

\* Refers to the pipe located between the building served connecting to the septic tank.

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**DPH** **\* Sewer Ventilation**

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**DPH** \* Getting to know your Septic System

"Septic Systems are important!"

Conventional Septic System

Main Line From Home, Septic Tank, Filtration, Drain Field Perforated Pipes & Gravel Trenches, Soil Absorption & Purification, Groundwater

\* <https://www.youtube.com/watch?v=HQJXEog1VXk>

**DPH** \* Septic Tank

\* Provides the primary treatment: separates, settles and digests

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**DPH** \* Septic Tank

- \* Concrete or plastic
- \* Provides the primary treatment: separates, settles and digests
- \* Tanks must be approved by CT DPH
- \* All new tanks require an effluent filter and are two compartments

**DPH** \* Septic Tank

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**DPH** \* Concrete Septic Tank

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**DPH** \* **Septic Tank Effluent Filter**



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**DPH** \* **Distribution Piping**

\* Consists of the piping leading from the septic tank to the leaching system.




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**DPH** \* **Distribution Piping**



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**DPH** \* **Distribution Box**



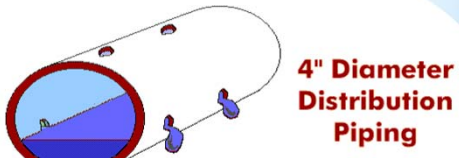
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**DPH** \* **Perforated Piping**



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**DPH** **Perforated Piping**



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**DPH** \* **Distribution Piping**

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**DPH** \* **Distribution Box**

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**DPH** \* **Distribution Box Installed**

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**DPH** \* **Leaching System**

\* Properly functioning leaching system should treat and disperse effluent (liquid from the septic tank) into the surrounding soils without breaking out onto the ground surface or polluting the groundwater.

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**DPH** \* **Leaching types**

- \* Trench
- \* Pits
- \* Galleries
- \* Proprietary products
  - \* Plastic chamber
  - \* Mats
  - \* Forms
  - \* Cardboard



## How does a leaching system work?

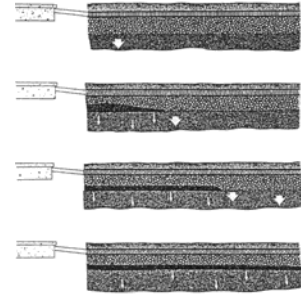
- \* Effluent from the septic tank is directed to the leaching system by the distribution piping
- \* A layer of biological slime is formed on the interface between the soil and the leaching system surface (BIOMAT)
- \* Provides treatment and slows down movement into the soil.



## Formation of a Biomat

Gravity Distribution

TIME



## \* Stone Trenches



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## \* Leaching Pit or Dry Well



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## \* Galleries - 12-inch high



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**DPH** \* Galleries - 27-inch Teepees



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**DPH** \* Galleries - 4' x 4'




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**DPH** Plastic Chambers-Infiltrators



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**DPH**



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**DPH** \* Form Cell: Living Filter



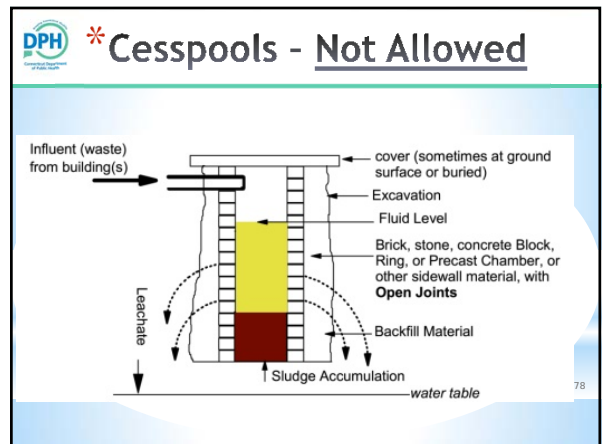
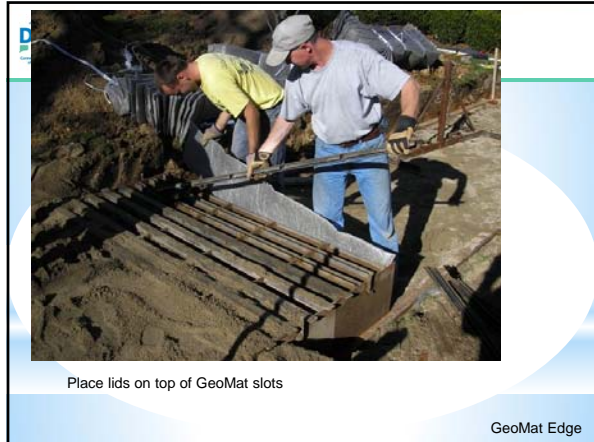
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**DPH** \* Living Filter




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 \* **Regulatory Jurisdiction**

\*Who Regulates in CT?






CT Department of Energy & Environmental Protection      Local and State Dept. of Public Health

 \* **Local and State Health Departments**

\* Conventional Septic Systems with Design Flows of 7,500 Gallons Per Day (GPD) or less.

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 \* **DEEP**

- \* Department of Energy and Environmental Protection
- \* Design Flows Exceeding 7,500 GPD
- \* Alternative
- \* Community Systems
- \* PHC B104 (end of the TS)

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