



# Septic Systems

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# SEPTIC SYSTEMS 101

## WHAT IS A SEPTIC SYSTEM?

- A system of components used to treat, and distribute waste water into the ground.
- Also known as On-site Wastewater Treatment System

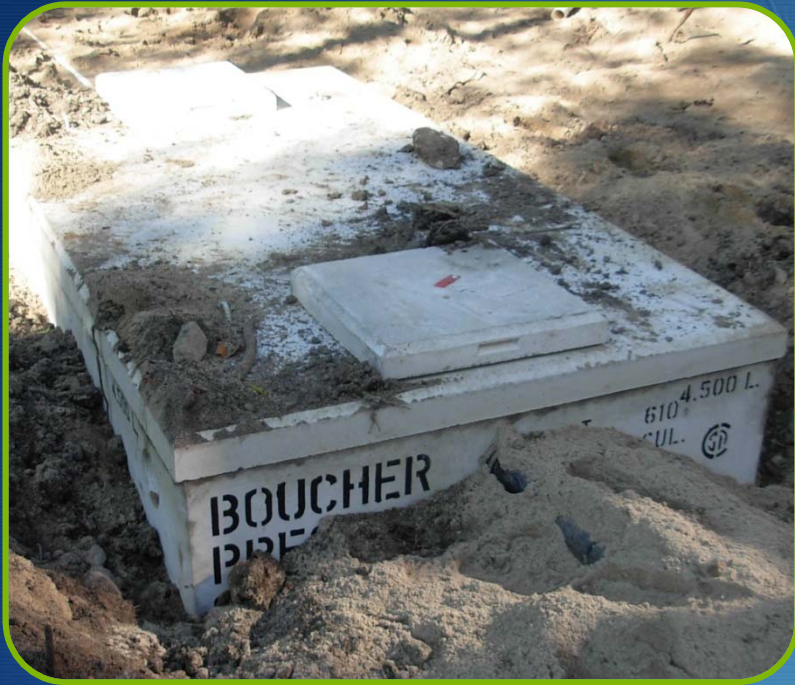




# Types of Septic Systems:

- Class 1 – Privy
- Class 2 – Greywater Pit
- Class 3 – Cesspool
- Class 4 – Septic Tank and Distribution Field
- Class 5 – Holding Tank





## Class 4 - Septic Tank & Distribution Field

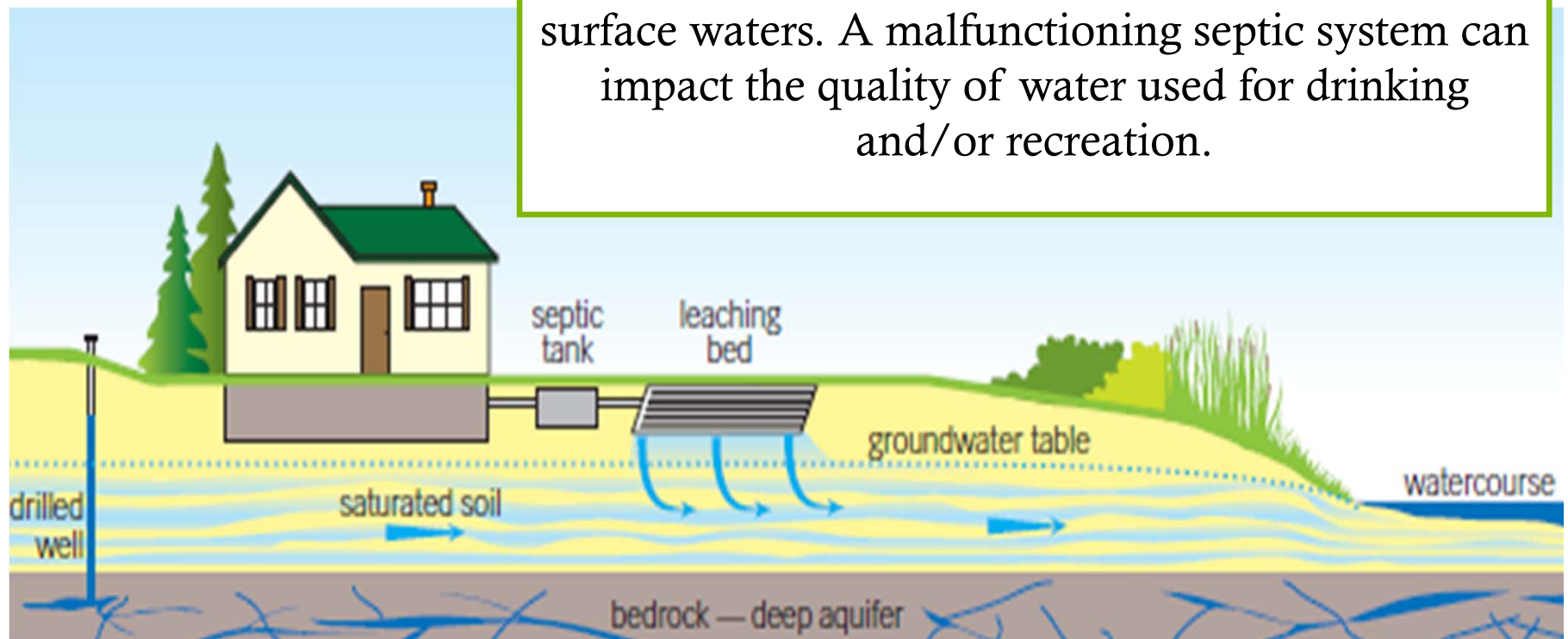
- Most common system
- Accepts both black water and greywater
- Different configurations:
  - Trench bed
  - Filter media
- Tertiary treatment
  - Higher level of effluent quality
    - = better for the environment
    - = smaller footprint
    - = less imported fill



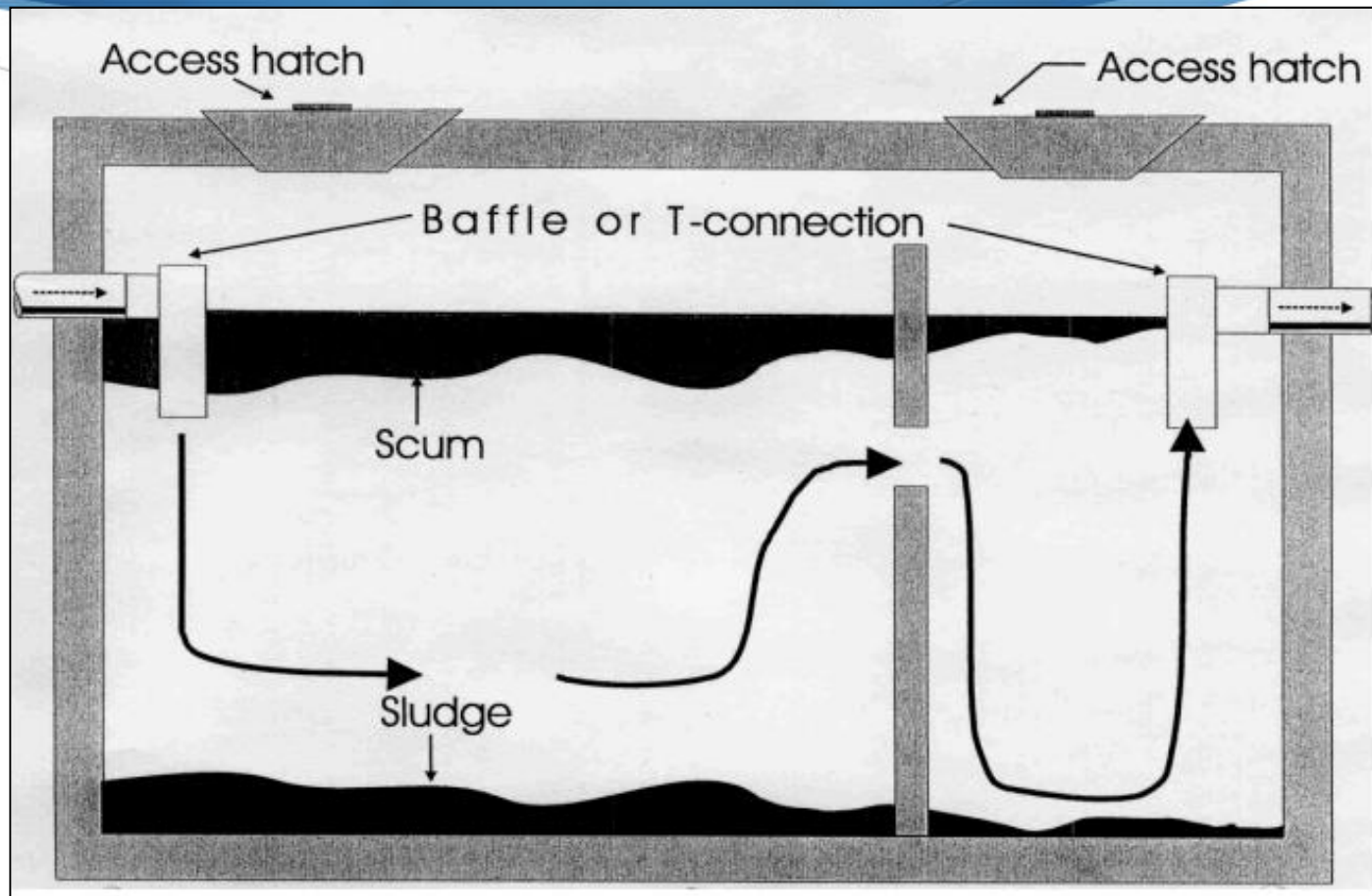
# FOCUS – CLASS 4

## WASTE TO WATER

Septic systems recharge the groundwater and surface waters. A malfunctioning septic system can impact the quality of water used for drinking and/or recreation.



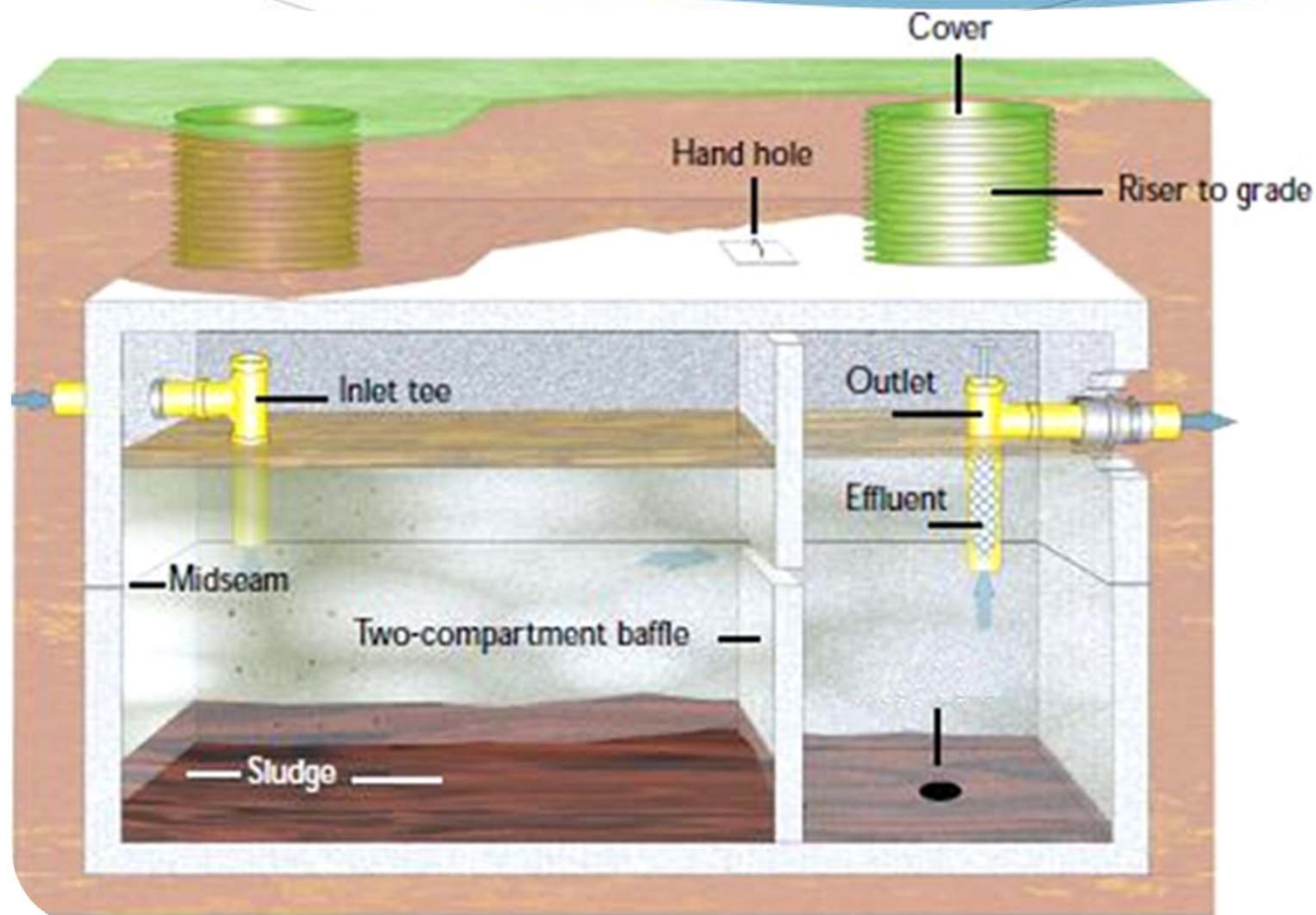
# Where does wastewater treatment start?



# PROCESSES WITHIN A SEPTIC TANK

- ◆ Separation of Suspended Solids
- ◆ Storage
- ◆ Digestion
- ◆ Microbial Growth

# THE SEPTIC TANK -CROSS-SECTION-



## Main Components

- Inlet pipe
- Water & “good” bacteria
- Compartments or chambers
- Partition wall
- Baffles
- Effluent filter
- Access hatches



# 2006 Code Change

## 8.6.2.1. Septic Tank Systems

(1) An *effluent* filter shall be installed in the outlet flow path of every *septic tank* that discharges *effluent* to a *leaching bed*.

(2) The *septic tank effluent* filter required by Sentence (1) shall conform to the requirements of NSF/ANSI 46, “Evaluation of Components and Devices Used in Wastewater Treatment Systems”, and shall be sized and installed in accordance with the manufacturer’s recommendations.

(3) A secured access opening to allow for regular maintenance of the *effluent* filter shall

# How an Effluent Filter Works

- ◆ The surface area is where solids impinge and either collect on the filter or become re-introduced into the water column.
- ◆ Microbial growth occurs on mesh.
- ◆ Require periodic maintenance.
- ◆ Uniform standard NSF46.

# EFFLUENT FILTERS -IMPROVING PERFORMANCE-

- Prevents solids from exiting the tank
- Should be NSF 46 certified
- Some unapproved styles may be easy to retro fit but will not be reliable.





# DISTRIBUTION FIELD



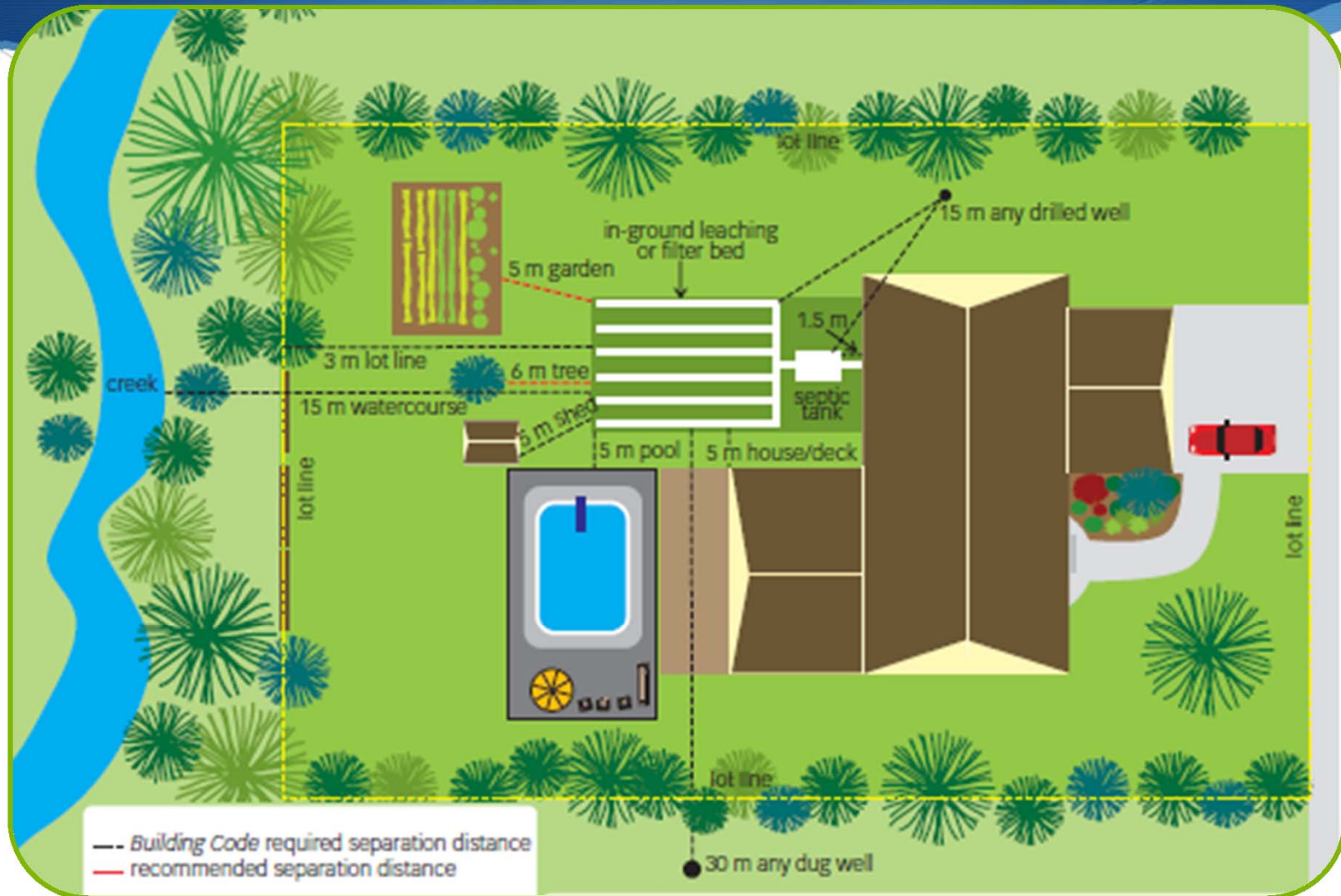


# Leaching Beds

- ◆ Gravel filled trenches
- ◆ 90 cm from limiting layer
- ◆ 50 cm wide
- ◆ 60-90 cm deep
- ◆ 1.6 m spacing
- ◆ Evenly distributed
- ◆ Aerobic environment

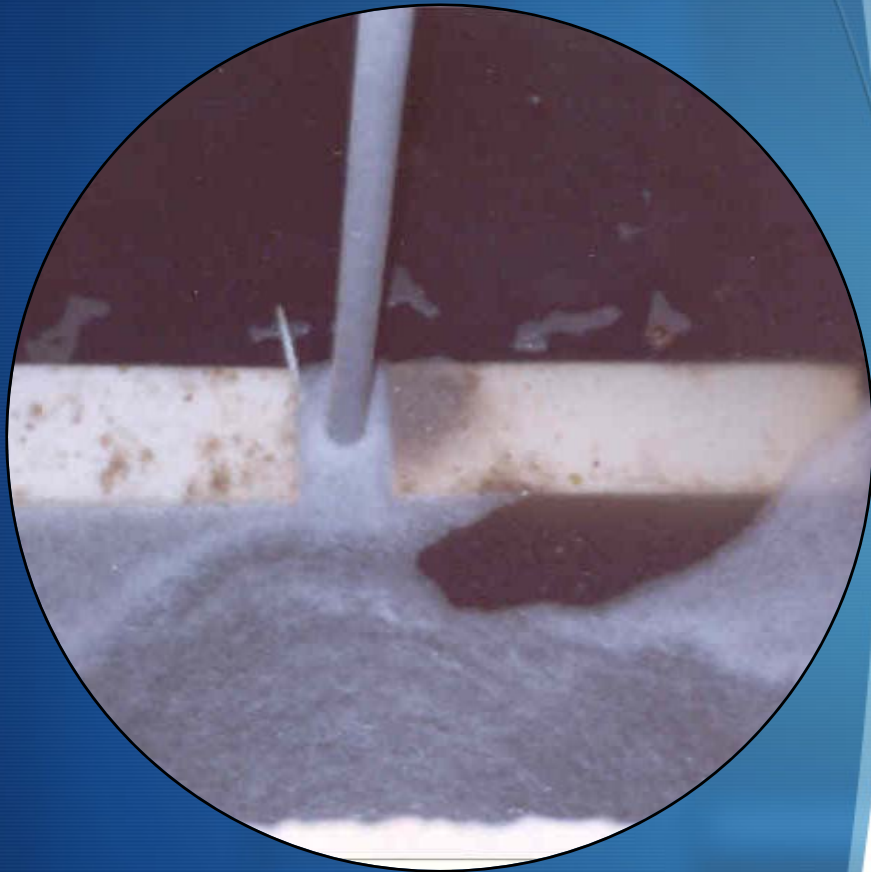


# LOCATION OF A SEPTIC SYSTEM





# ALTERNATIVE ON-SITE TECHNOLOGIES



Beneficial for:

- Cottage and Residential Properties
- Area within close proximity to sensitive lakes and rivers
- Lands with shallow soils to bedrock or High groundwater table
- Properties with Clay soils
- Sloped sites....

# EFFLUENT QUALITY

PARAMETER	SEPTIC TANK	TREATMENT UNIT
Effluent Quality	BOD ~ 200 mg/L TSS ~ 200 mg/L E.coli ~ 1 million cfu/100 mL	BOD = 10 mg/L TSS = 10 mg/L (tertiary standard) E. Coli ~ 10,000 cfu/100 mL
% treatment prior to soil absorption	10 – 20%	80 – 90%

- Higher quality effluent entering the soils allows for a reduced separation distance to bedrock or high groundwater table

# ALTERNATIVE METHOD OF DISPOSAL FOR TREATMENT UNITS

## Area Beds



## Shallow Buried Trenches



- Treatment units can be used in conjunction with conventional distribution fields as well.



# Operation And Maintenance

Improper operation and  
maintenance can cause  
system failure



# OPERATION AND MAINTENANCE

## Tank Pump Out

- Every 3-5 years (depends on system size and load)
- When scum and sludge equal  $>1/3$  of total tank volume
- Removes built up sludge
- Prevents solids from exiting tank

# Locating the Treatment Unit

Basic methods to locate the treatment unit:

- ◆ Check first if the previous owner knows location of tank(s)
- ◆ Review any available plans/documents on the system
- ◆ Follow sewer pipe outlet in basement to determine exiting wall





# Locating the Treatment Unit

- ◆ Observe seasonal indicators (no grass in summer-no snow in winter)
- ◆ Use a metal rod soil probe and test suspected side of house starting 1.5m (5ft.) from house wall (use extreme care- probes will puncture plastic tanks!)
- ◆ Check that there are not multiple tanks or other treatment units present



# Assessing the Treatment Unit

- ◆ The following observations should be noted for septic tanks: (cont'd)
  - ◆ Signs of biological activity in the liquid (healthy vs. dead)
  - ◆ Possible water infiltration from cracks, joints, leaching bed backflow
  - ◆ Measured dimensions of tank

**Caution:** A treatment unit is a confined space- do not enter without proper safety attire!



# Locating the Leaching Bed

- ◆ Use similar techniques as for the distribution system
- ◆ Look for obvious indicators:
  - ◆ Partially raised mounds
  - ◆ Greener grass
  - ◆ Striping in the lawn
  - ◆ Sponginess when walked on
- ◆ Probe suspect area to determine the extent of bed





# Assessing the Leaching Bed

- ◆ For test holes, record observations for: (cont'd)
  - ◆ Thickness of clear stone
  - ◆ Pipe diameter, material, etc.
  - ◆ Presence of biomat
  - ◆ Presence of effluent or groundwater ponding
  - ◆ Characteristics of soil under trenches



# Assessing the Distribution System

- ◆ For pump chambers, record observations on:
  - ◆ Float switches
  - ◆ Electrical control seals
  - ◆ Valve operation
  - ◆ Integrity of piping
  - ◆ Alarm and float operation
  - ◆ Dose volumes





# Checking the Tank

- ◆ Have the tank pumped while present
- ◆ Check the scum and sludge depth for accumulation
- ◆ Check seal on tank lids
- ◆ Listen for water coming into the tank
- ◆ Check interior of tank



**DO NOT ENTER THE  
TANK AT ANY TIME**



# Does Chloride Affect Tank Corrosion?



Corroded Outlet Baffles of two Tanks Receiving Water Softener Backwash – Does chloride accelerate the corrosion caused by  $H_2S$  gas?

# Operation And Maintenance

- ◆ Protect your leaching bed
  - ◆ Avoid compacting soils
  - ◆ Avoid damaging pipes
  - ◆ Avoid saturation of leaching bed
  - ◆ Do not plant trees near leaching bed
- ◆ Control input
  - ◆ Practice water conservation
  - ◆ Reduce solid waste
  - ◆ Control discharge of harmful chemicals

# OPERATION AND MAINTENANCE

## Control input

- Practice water conservation
- Chlorine bleach
- Medicines
- Cigarette butts
- Antifreeze
- Paints or solvents - Nail polish remover - Chemical cleaners
- Gas, motor oil
- 3 ply toilet tissue or facial tissue
- Hair or dental floss
- Fats, Oils or Greases



# Common Causes of Leaching Bed Malfunction

- ◆ **Age**
- ◆ **Distribution box or header is off level**
- ◆ **Pumps not cycling properly**
- ◆ **Pump Floats fouled with grease**
- ◆ **Excess sewage flow and excess liquid getting to the ground surface**



# How Do You Know If You Have a Problem?

## Symptoms

- Soft & Spongy Ground Over Leaching Bed
- Lush Patches of Grass Over Leaching Bed



- Pools of Dark Water
- Over Leaching Bed
- Weak to Very Strong
- sewage odour in bed area



# Dangers of Improperly Functioning Systems

## Effects

- ◆ Ground & surface water contamination
- ◆ Costly repairs or replacement





# Take Action

- ◆ Know your system
    - ◆ Where it is & how it works
    - ◆ Be alert to changes
  - ◆ Prevent problems (before they start)
    - ◆ Control what goes into your system
    - ◆ Proper maintenance
    - ◆ Regular inspections
    - ◆ Research, learn & share information
- \*Initiate a re-inspection program\***

**THE END**

**SOURCES OF INFORMATION**

[www.uoguelph.ca/orwc](http://www.uoguelph.ca/orwc)

[www.oowa.org](http://www.oowa.org)

[www.rvca.ca](http://www.rvca.ca)

