

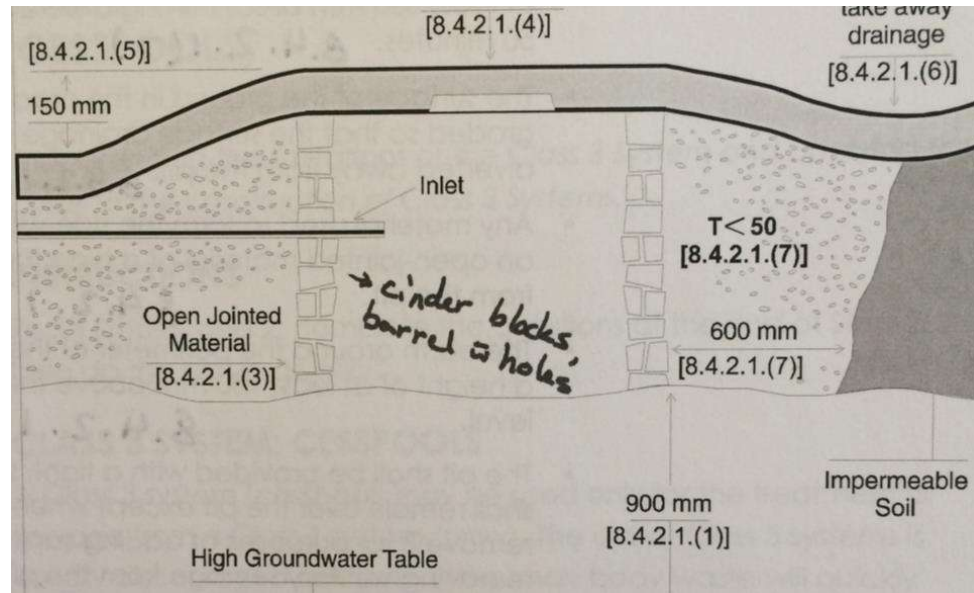
SEPTIC SOCIAL

Thank you

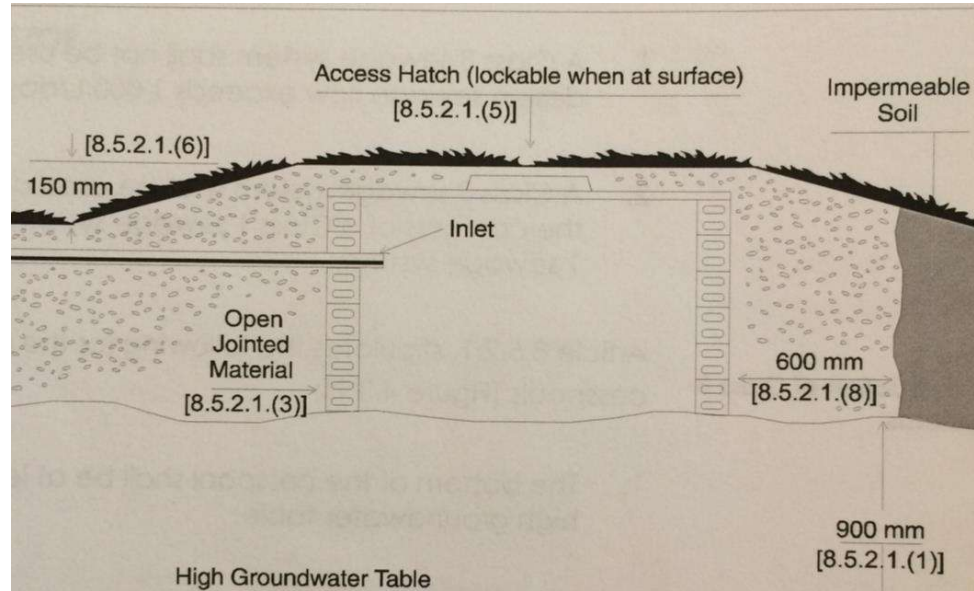
- University of Guelph – Ontario Rural Wastewater Centre
 - Bassim Abassi, Ph. D.
 - Chris Kinsley, Ph. D., P. Eng.

What is an On-Site Sewage System?

- 3 Components:
 - Tank
 - Distribution System
 - Filtering Bed
- 5 Classes:
 - Class 1: Privies
 - Class 2: Greywater Systems
 - Class 3: Cesspools
 - Class 4: Leaching Beds
 - Class 5: Holding Tanks

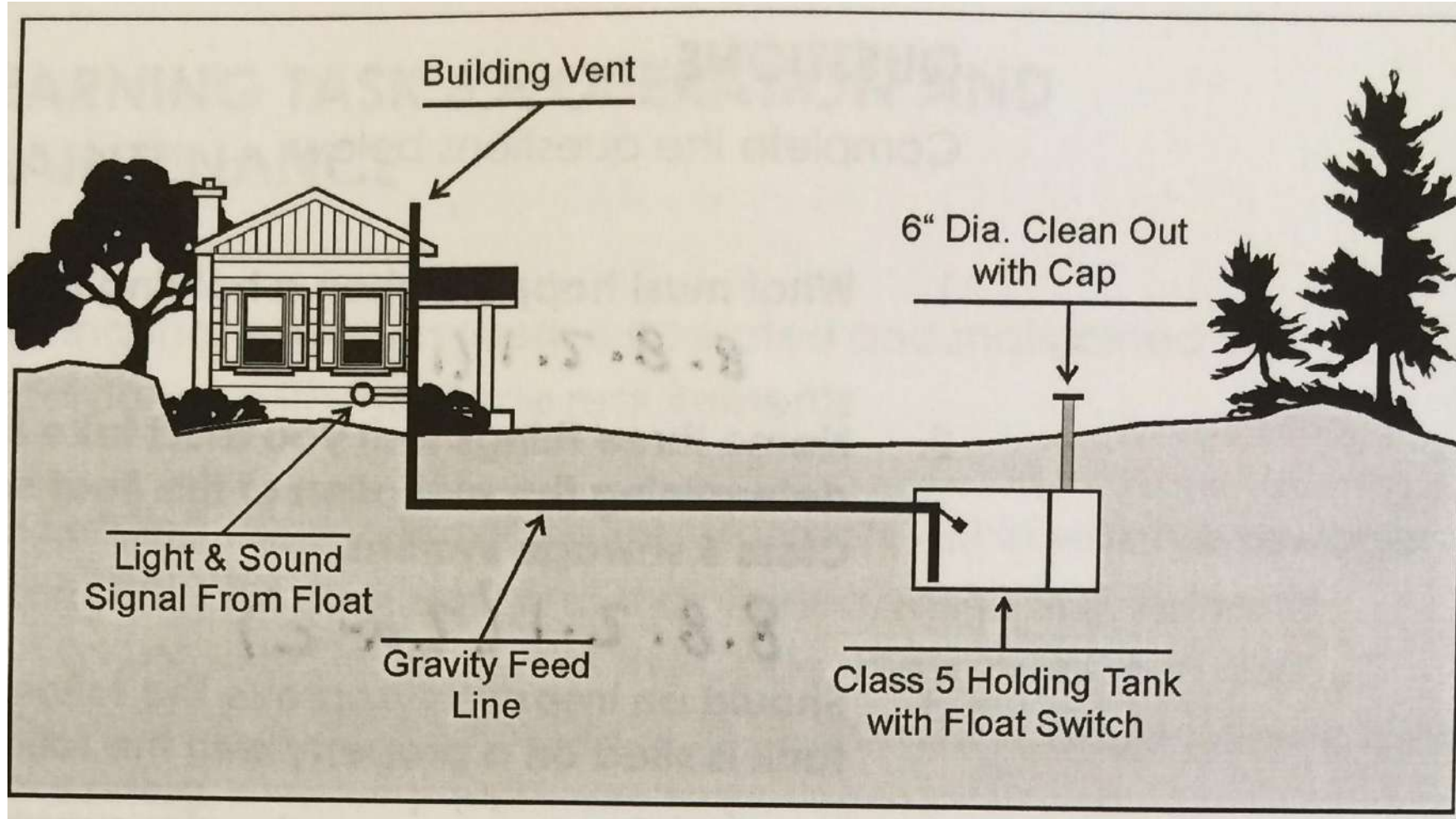


CLASS 2 SYSTEMS: GREYWATER TREATMENT



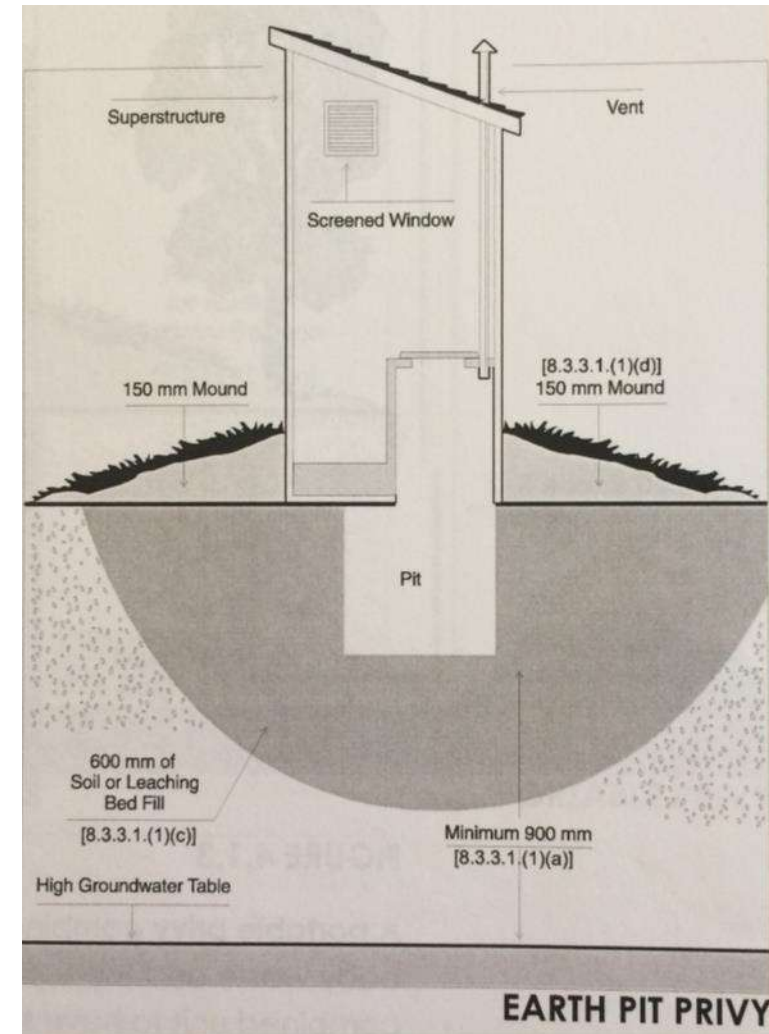
CLASS 3 SYSTEMS: CESSPOOLS

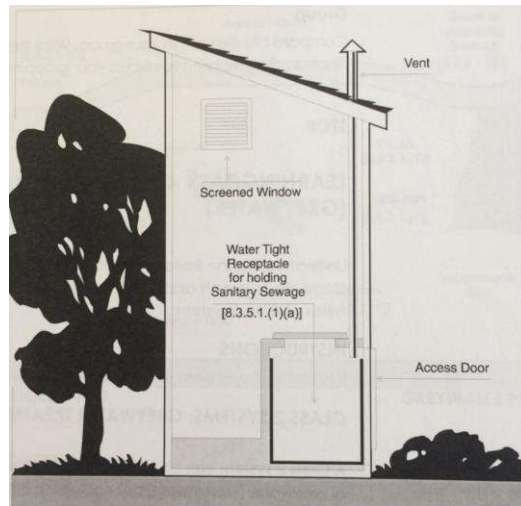
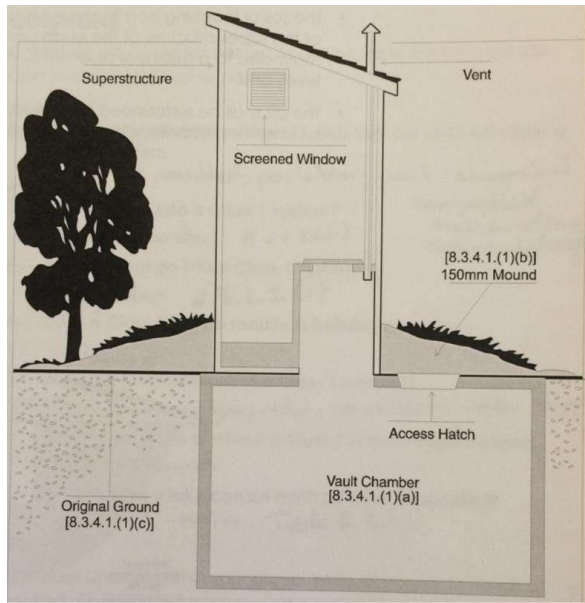
Class 5 Systems: Holding Tanks



Class 1 Systems: Privies

- Defined as:
 - Chemical Toilet
 - Incinerating Toilet
 - Recirculating Toilet
 - Self-Contained Portable Toilet
 - Privies (aka Outhouses)
 - Portable Privy
 - Earth Pit Privy
 - Pail Privy
 - Privy Vault
 - Composting Toilet Systems

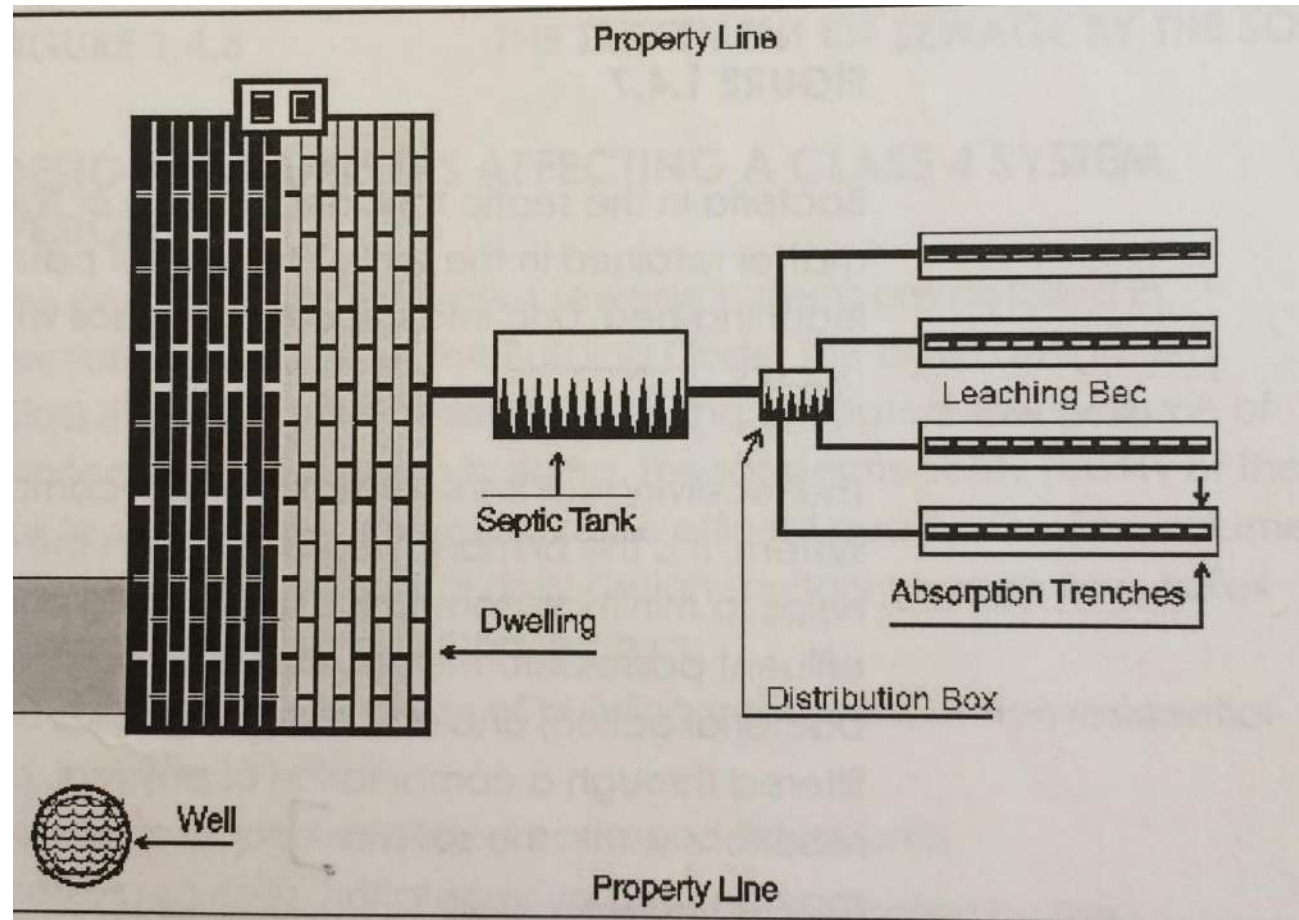




Privy Examples

- Vaulted Privy
- Portable Privy

Class 4 Systems: Leaching Beds



Septic Tank



Concrete

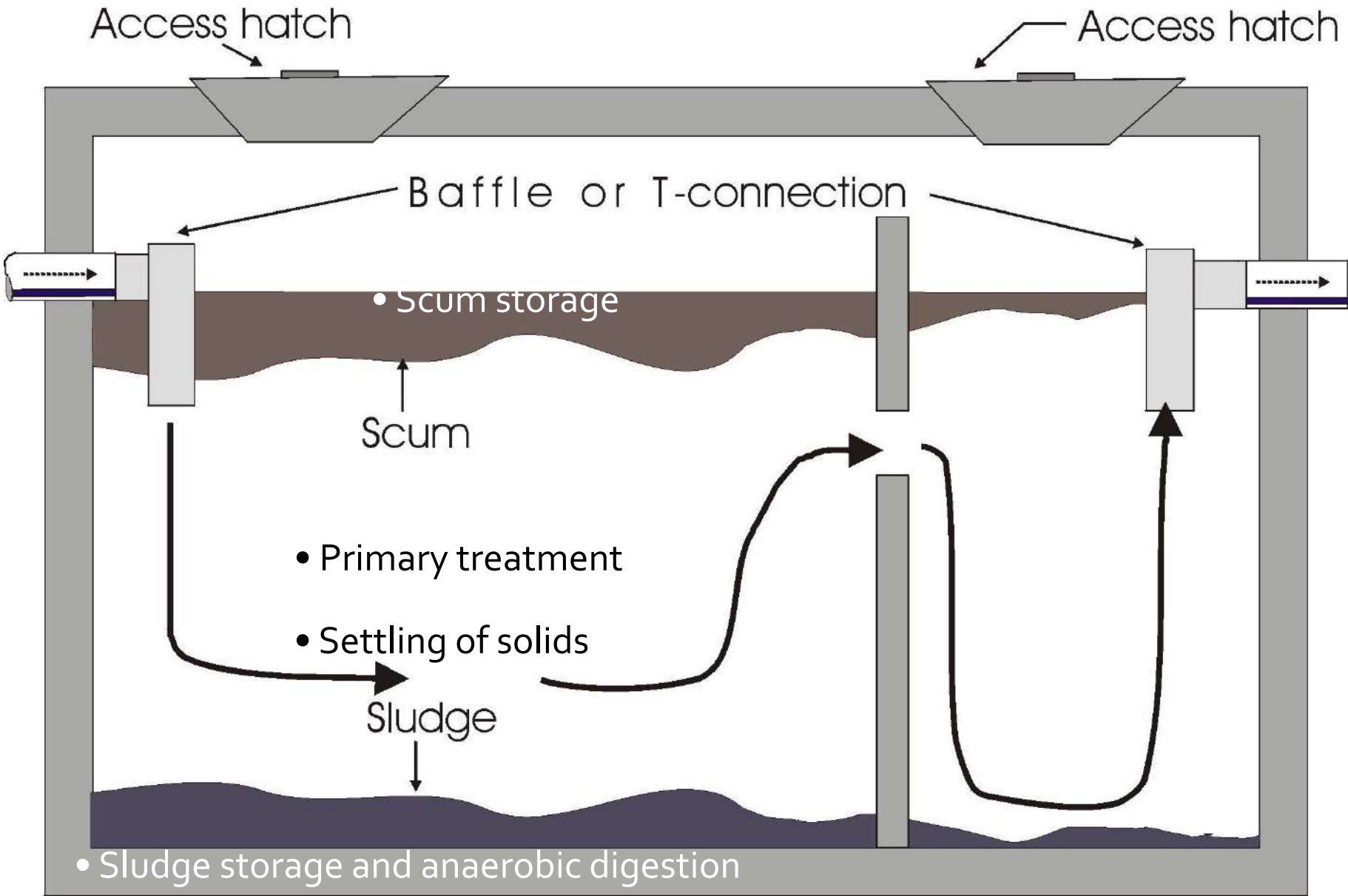


Fiberglass

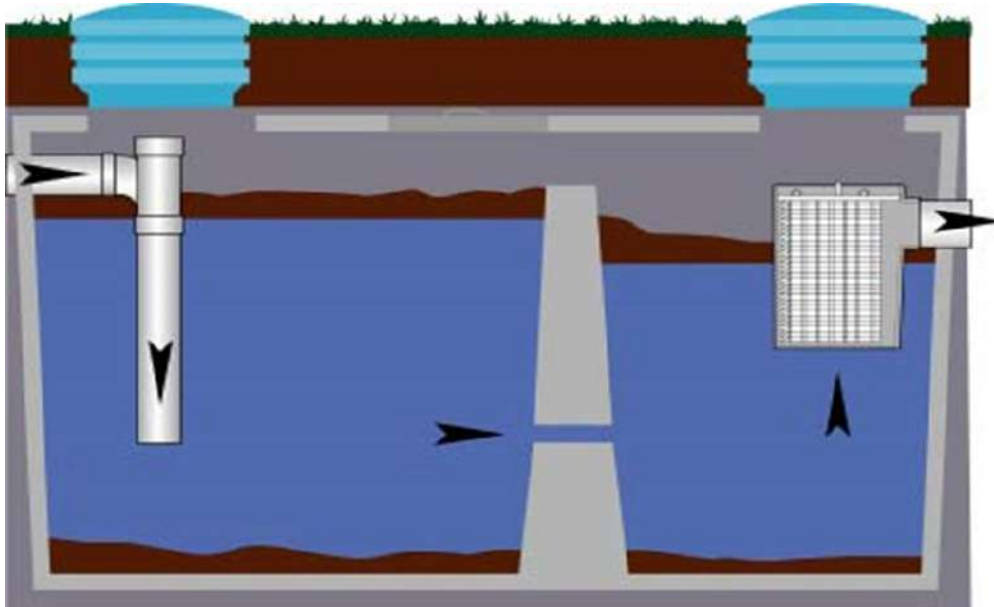
Polyethylene



COMMON SEPTIC TANK



Effluent Filters



- Mandatory for all NEW Septic Tank installations as of January 1, 2007

Treatment Units

- Allows for a greater flexibility in placing a wastewater system on a property – usually a very small footprint
- Ecoflo
- Waterloo Biofilter
- Bionest, etc.

Other Treatment Unit Effluent Quality Criteria
Forming Part of Sentences 8.6.2.2.(1) and (2)

| Item | Column 1 | Column 2 | Column 3 |
|------|---|---------------------------------|----------------------------------|
| | Classification of Treatment Unit ⁽¹⁾ | Suspended Solids ⁽²⁾ | CBOD ₅ ⁽²⁾ |
| 1. | Level II <i>aerobic</i> | 30 | 25 |
| 2. | Level III | 15 | 15 |
| 3. | Level IV | 10 | 10 |
| | <i>Septic tanks</i> | <i>150</i> | <i>150</i> |

Components

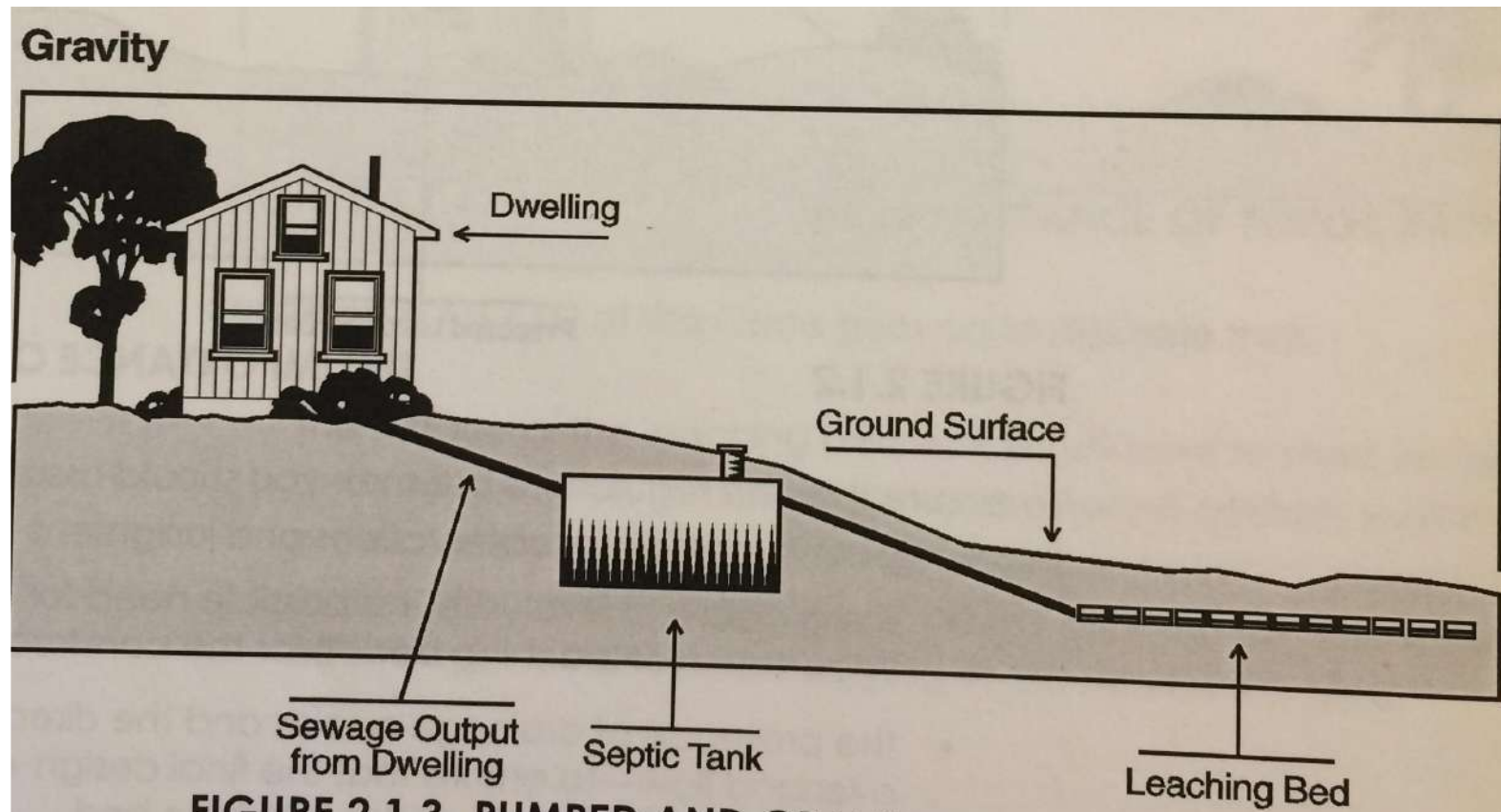
- Distribution Piping
- Distribution Box
- Distribution Header
- Pumping System
- Pipe Connectors

Types

- Gravity
- Dosed
- Pressurized

Distribution

Gravity Flow Distribution



Distribution

Dosed

- Distribution pipe is 150 m or more
- Pumps and siphons

Pressurized

- Maintained pressure
- Most efficient for even distribution

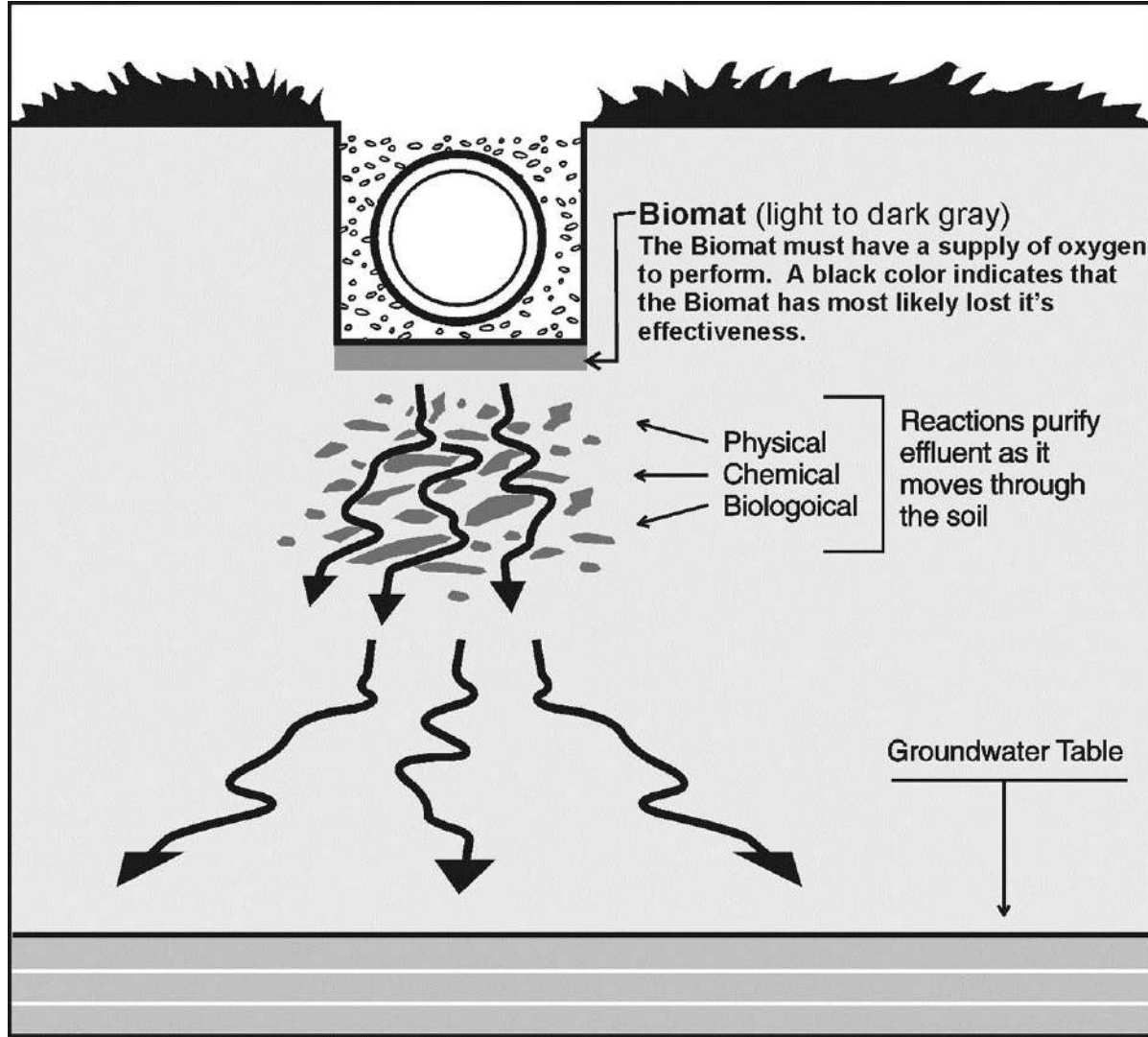


Leaching Bed

Functions:

Treatment of effluent in the soil

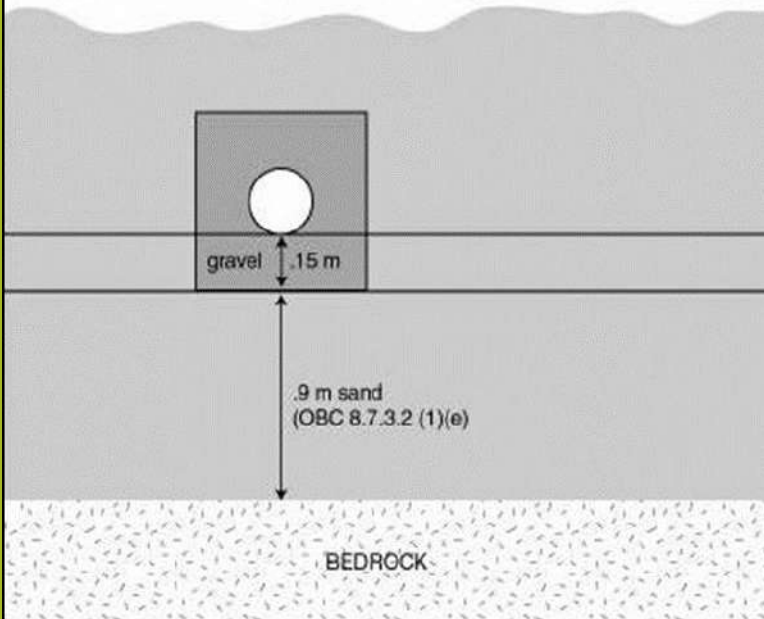
Absorption of the treated effluent by the underlying and surrounding soil



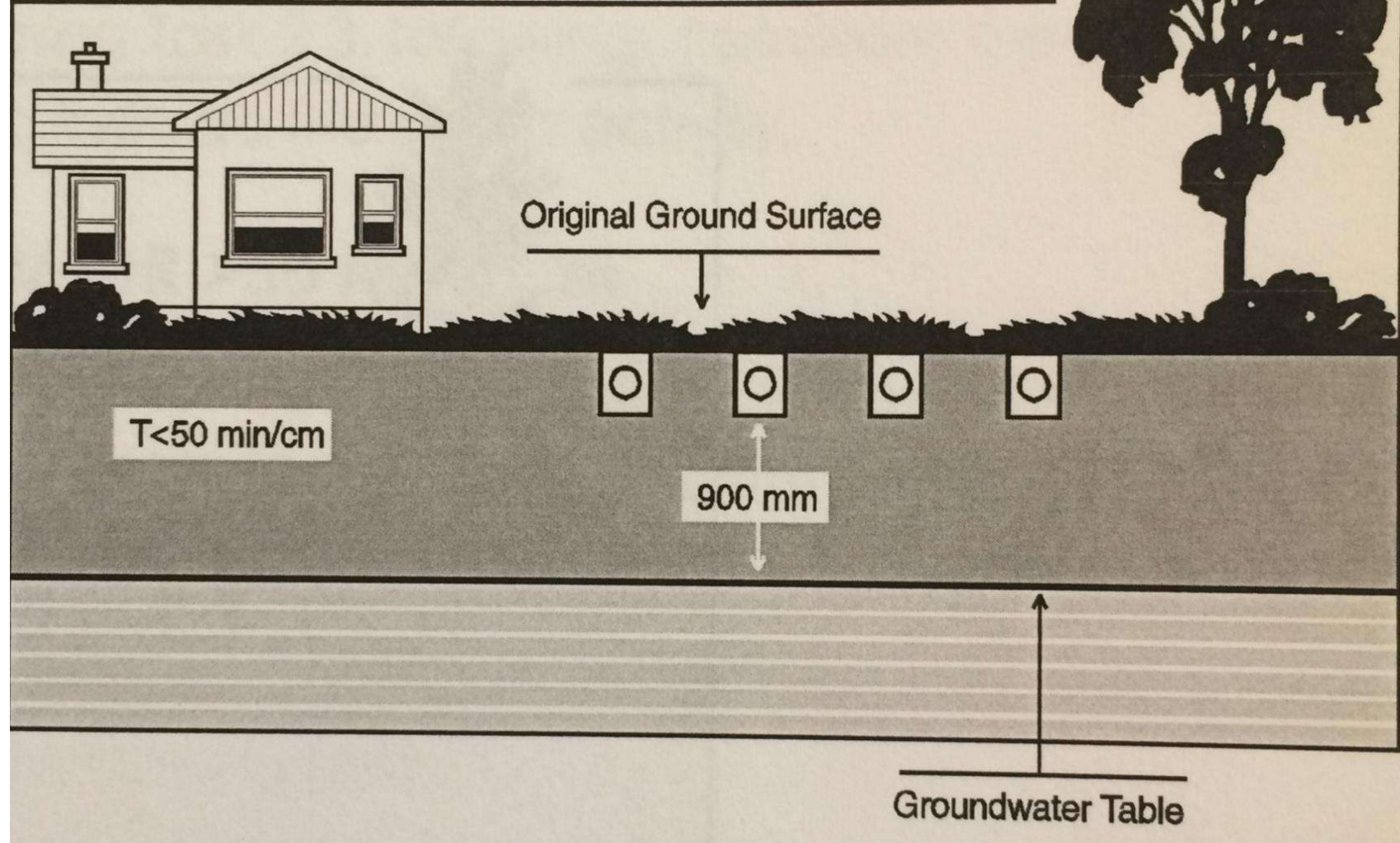
BIOMAT



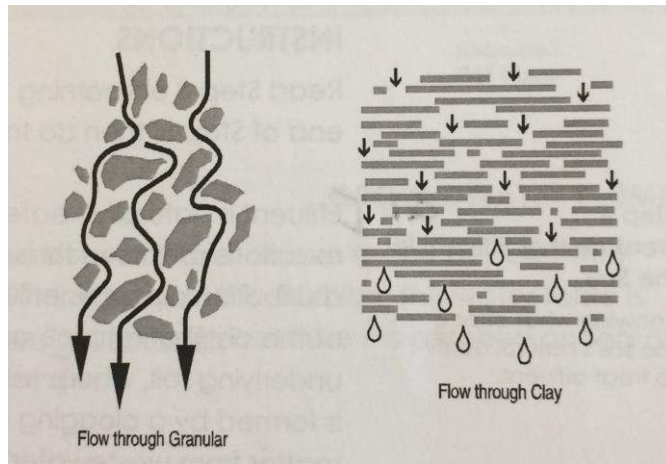
Required Under Building Code Act



Standard In-Ground



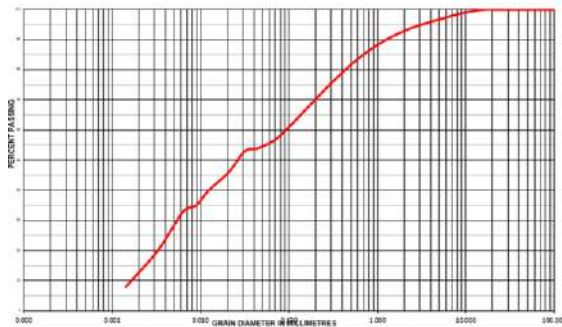
Soils



- Clay = Not Effective Filter
- Gravel = Not Effective Filter

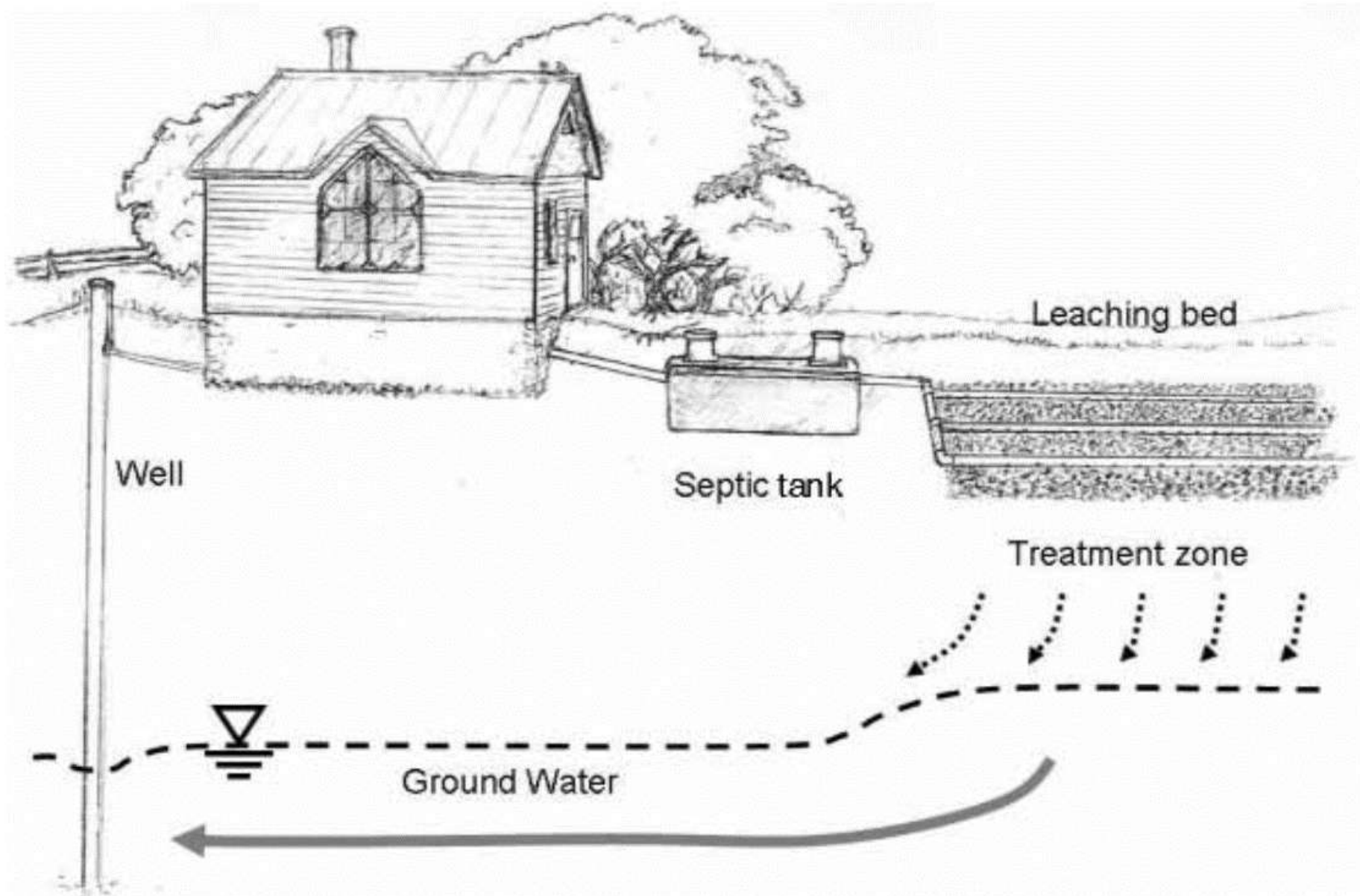
- Looking for a T-time between 1 min/cm and 50 min/cm

GRADATION OF SAMPLE SUBMITTED TO BE USED AS NATIVE MATERIAL FOR LEACHING BED CONSTRUCTION

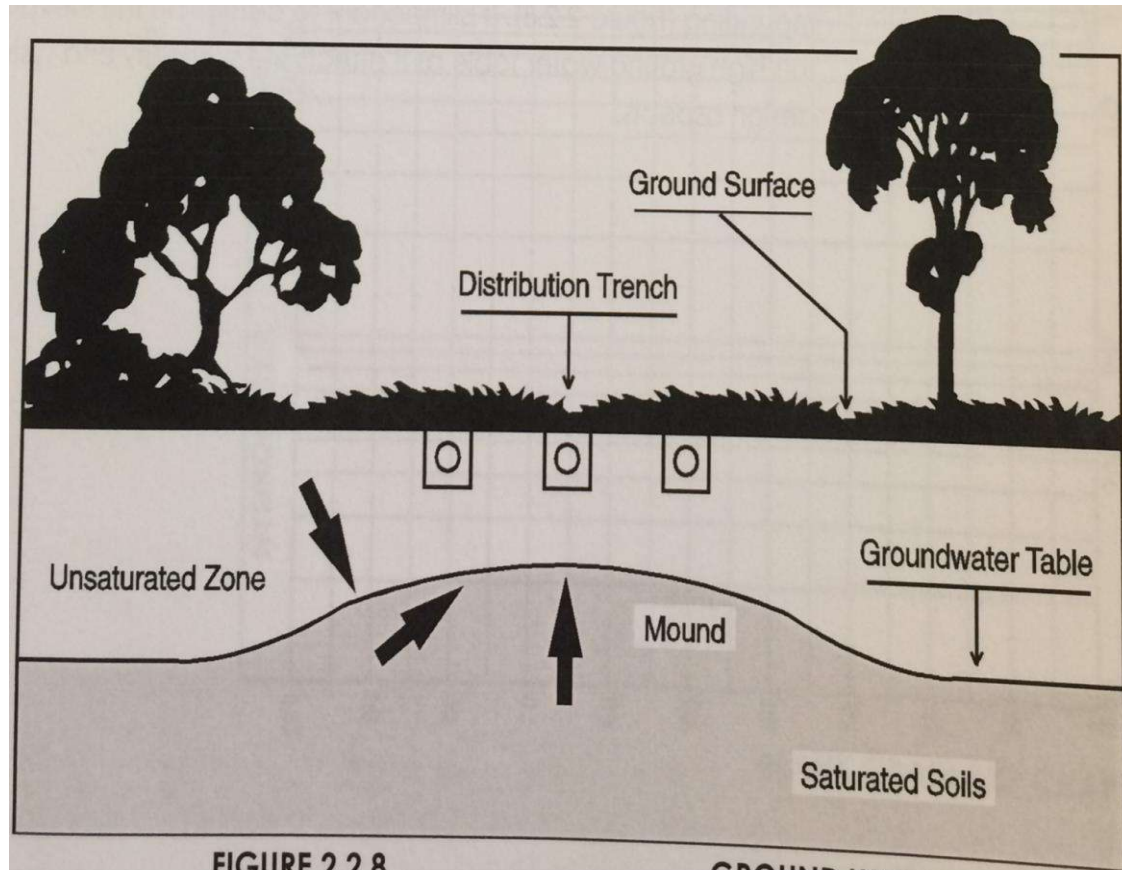


| Clay | Silt | Medium Sand | Coarse Sand | Fine Gravel | Medium Gravel | Coarse Gravel |
|------|-------|-------------|-------------|-------------|---------------|---------------|
| | 0.075 | 0.425 | 0.850 | 2.000 | 4.750 | 9.500 |

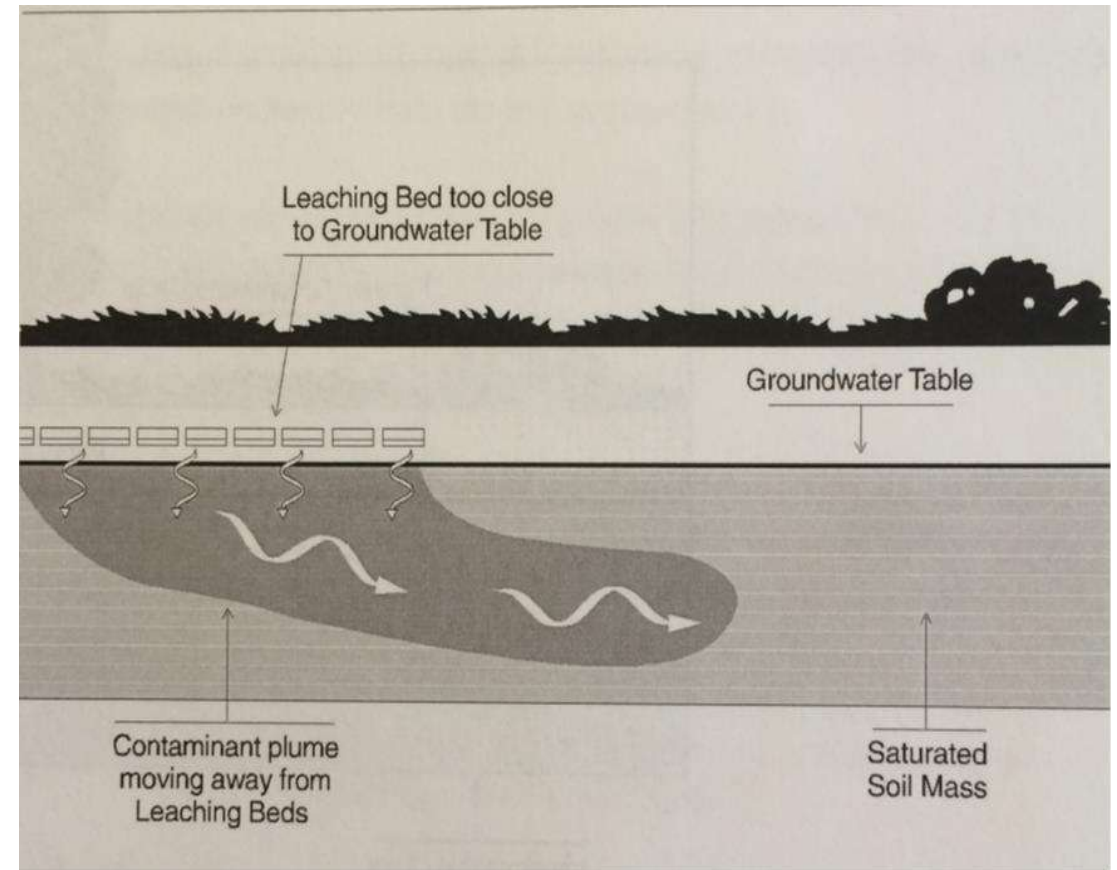
| UNIFIED SOIL CLASSIFICATION | | UNIFIED SOIL CLASSIFICATION: | | ML |
|-----------------------------|--------|------------------------------|--|-----------------|
| D ₁₀ = | 0.0017 | Estimated Hyd. Cond. (K) = | | 2.89E-06 cm/sec |
| D ₆₀ = | 0.09 | Estimated Perc. Time (T) = | | 35-50 min/cm |
| C _u = | 55.3 | Recommended Perc. Time (T) = | | 50 min/cm |



Mounding

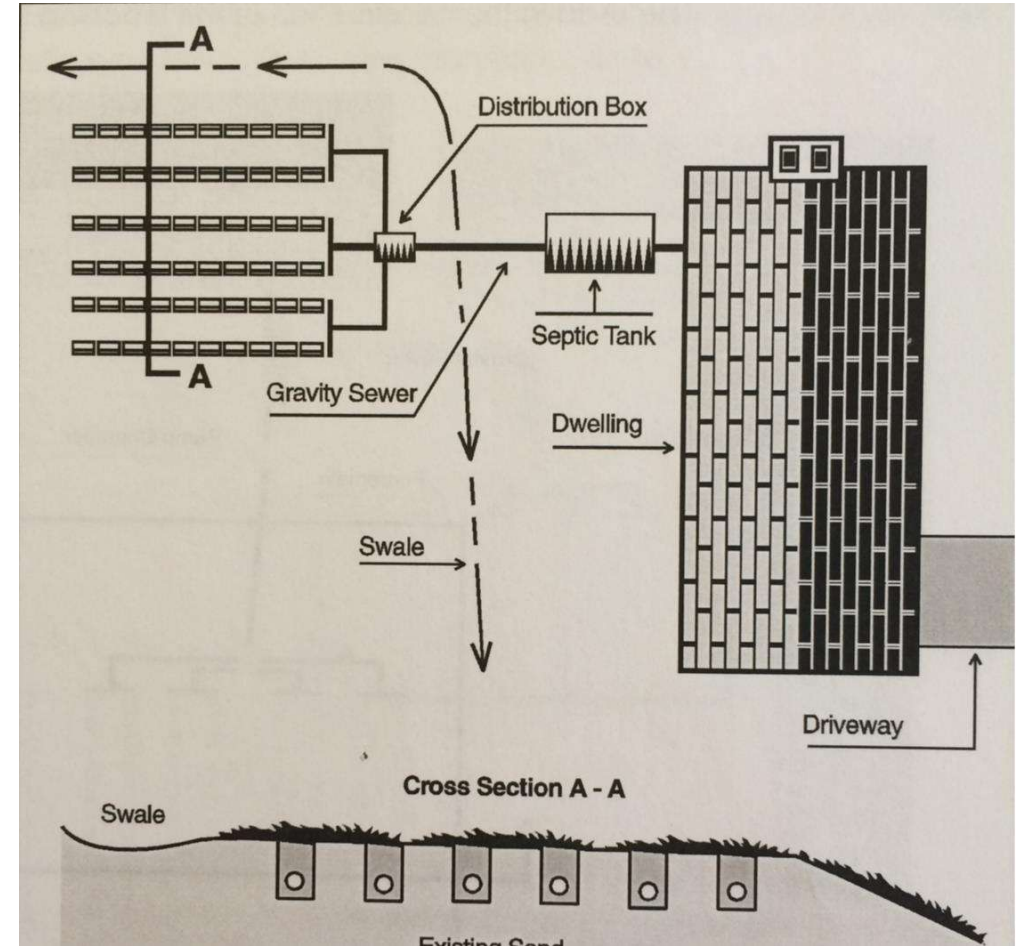


Plume

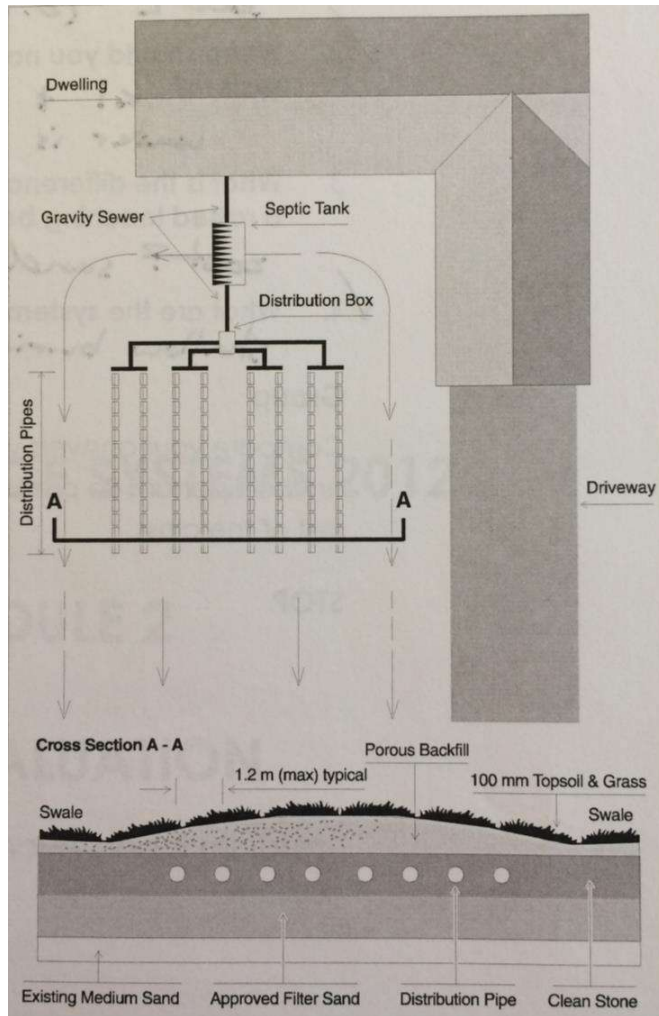


Conventional In-Ground

- The high ground water table or bedrock is more than 90 cm below the bottom of the trenches, and
- The percolation rate of the soil ranges between 1 and 50 min/cm.



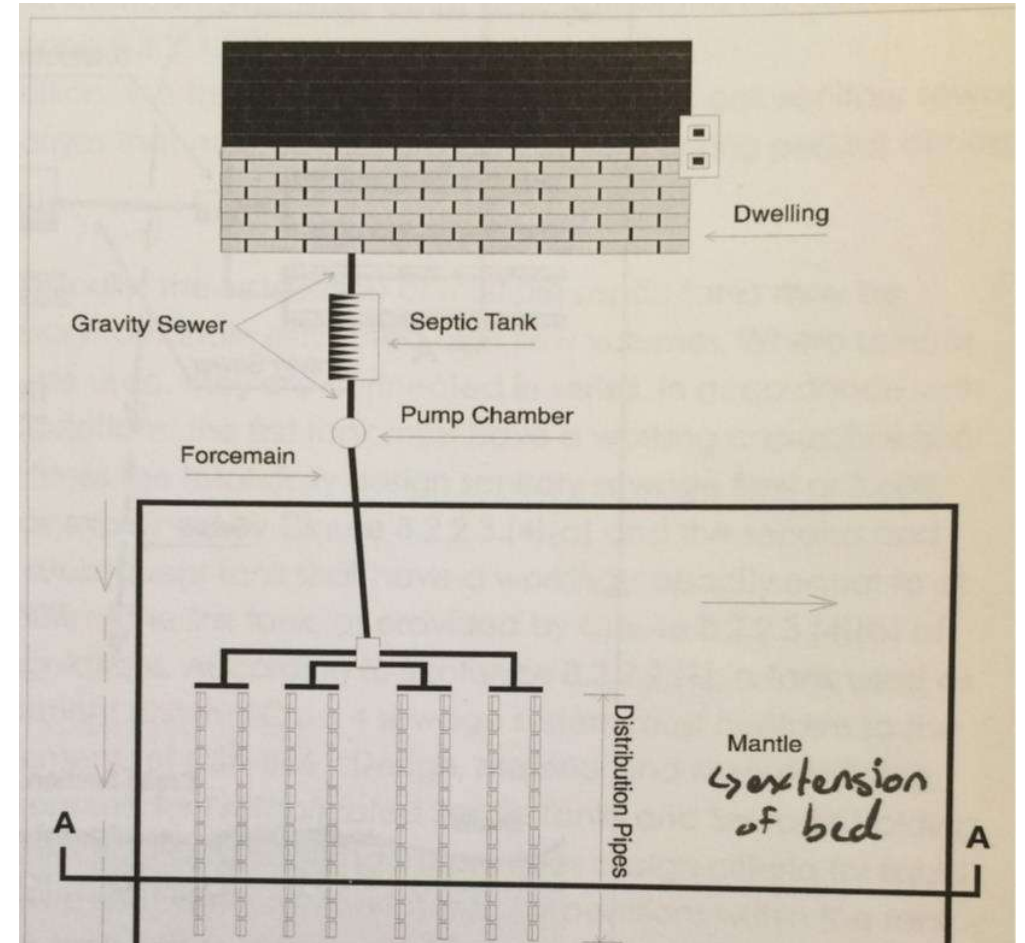
Filter Bed System



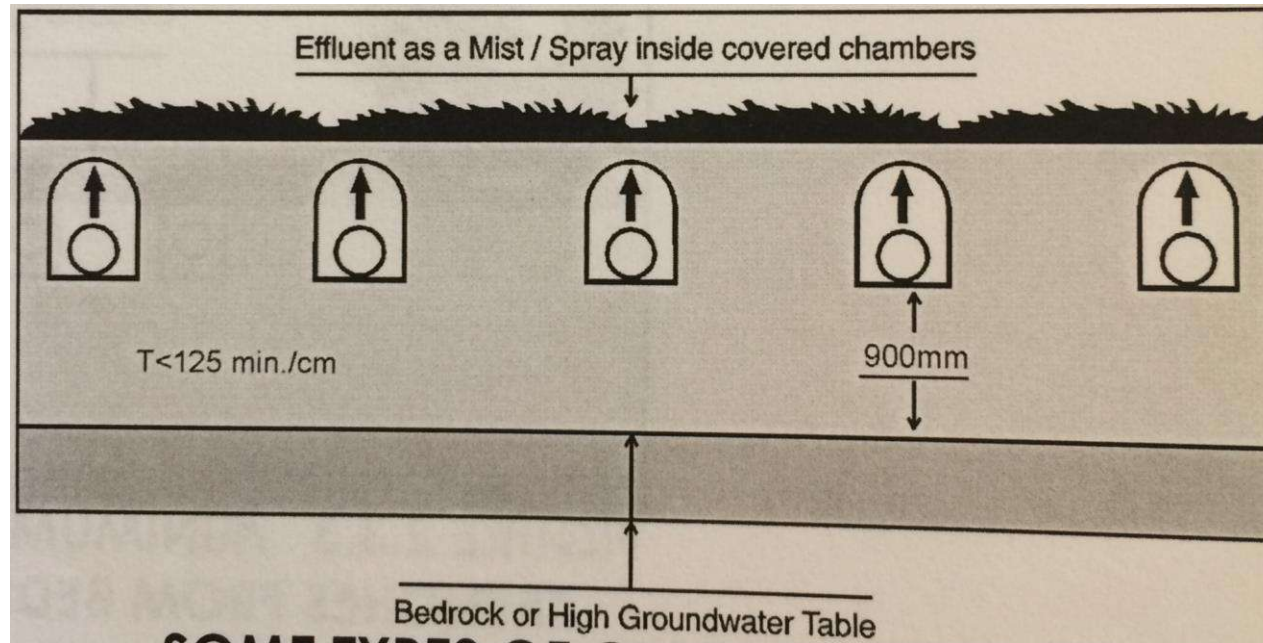
- When to use?
 - Insufficient area
 - Natural features
- Can be
 - In-ground
 - Partially raised
 - Partly excavated
 - Fully raised

Raised Leaching Bed

- The high ground water table or bedrock is less than 90 cm below the bottom of the trenches, or
- The t-time of the soil is less than 1 min/cm or greater than 50 min/cm



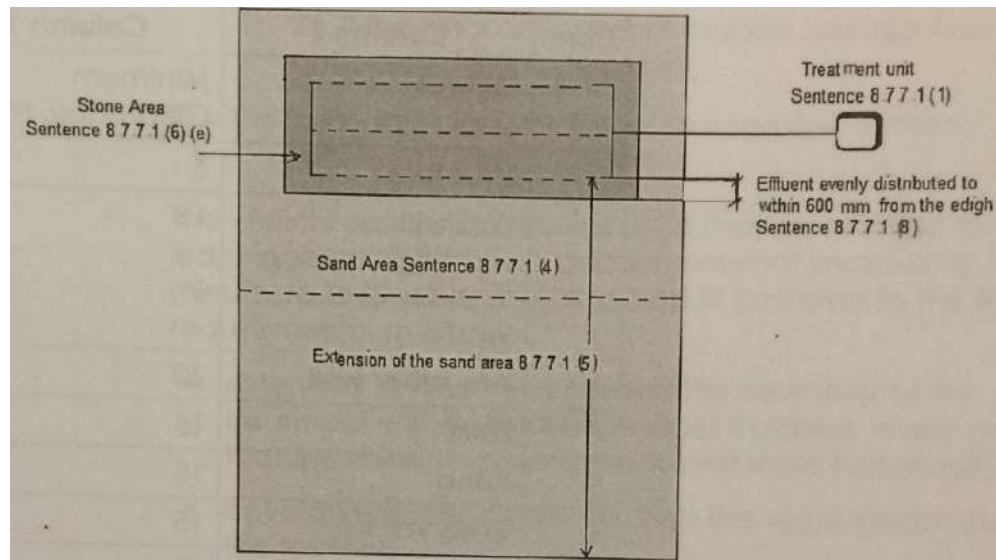
Shallow Buried Trench



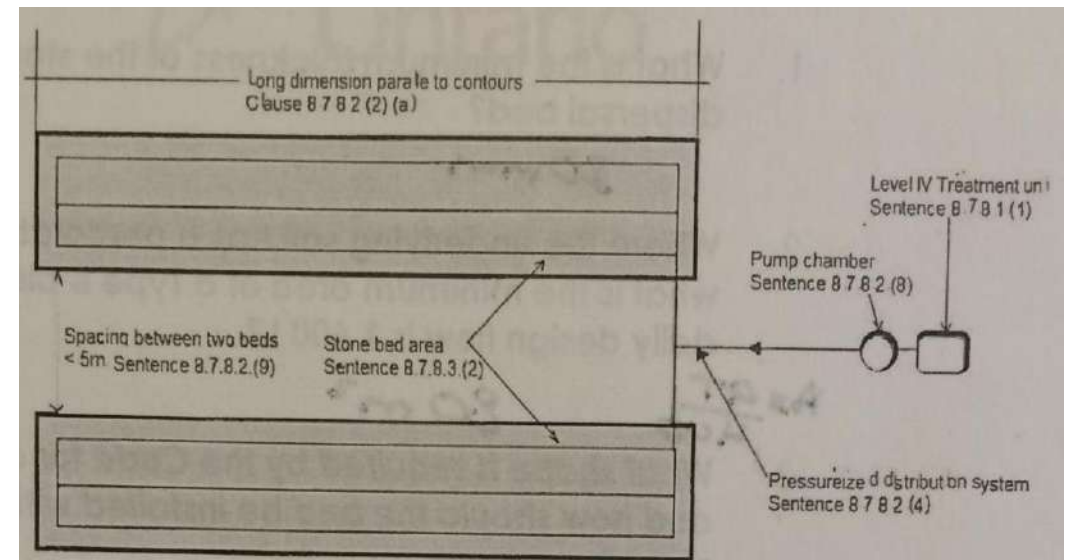
- It is designed to receive an effluent from Level IV treatment unit;
- The effluent being discharged to the trench is time-dosed; and
- The percolation time of the soil receiving the pre-treated effluent is between 1 and 125 min/cm.

Dispersal Beds

Type A Dispersal Beds



Type B Dispersal Beds



CLEARANCE DISTANCES

| From ↓ | To → | Earth Pit Privy | Privy vault Pail privy | Greywater system | Cesspool |
|---|------|--------------------|-------------------------------|---------------------|----------|
| A well with a watertight casing to a depth ≥ 6 m | | 15 | 10 | 10 | 30 |
| A spring used as a source of potable water, or a well other than one with watertight casing to ≥ 6 m | | 30 | 15 | 15 | 60 |
| A lake, river, pond, stream, reservoir, or a spring not used as a source of potable water | | 15 | 10 | 15 | 15 |
| A property line | | 3 | 3 | 3 | 3 |

FIGURE 2.1.5 MINIMUM HORIZONTAL DISTANCES FOR CLASS 1, 2 AND 3 SEWAGE SYSTEMS [FORMING PART OF SENTENCE 8.2.1.5.(1)]

CLEARANCE DISTANCES

| From ↓ | To → | Treatment Units | Distribution Piping | Holding Tanks |
|---|------|-----------------|---------------------|---------------|
| Structure | | 1.5 | 5 | 1.5 |
| Well with a watertight casing to a depth ≥ 6 m | | 15 | 15 | 15 |
| Any other well | | 15 | 30 | 15 |
| Lake, pond, reservoir, river | | 15 | 15 | - |
| Spring not used as potable water | | 15 | 15 | 15 |
| Stream | | 15 | 15 | - |
| Property line | | 3 | 3 | 3 |
| Forming parts of Sentences | | 8.2.1.6.(1) | 8.2.1.6.(2) | 8.2.1.6.(3) |

FIGURE 2.1.6 MINIMUM CLEARANCES FOR CLASS 4 AND 5 SEWAGE SYSTEMS

CLEARANCE DISTANCES

| | From a well with watertight casing to a depth of ≥ 6 m | From a spring used as a source of potable water, or well other than a watertight casing to a depth ≥ 6 m | From a lake, river, pond, stream, reservoir, or spring not used as a source of potable water | From a property line |
|---------------------------------|---|---|--|----------------------|
| Earth pit privy | 15 | 30 | 15 | 3 |
| Vault privy, pail privy | 10 | 15 | 10 | 3 |
| Cesspool | 30 | 60 | 15 | 3 |
| Leaching pit | 10 | 15 | 15 | 3 |
| Leaching bed distribution pipe* | 15 | 30 | 15 | 3 |
| Septic tank or treatment unit† | 15 | 15 | 15 | 3 |

*Leaching bed distribution piping must be at least 5 m from any building or structure.

†Septic tanks or treatment units must be at least 1.5 m from any building or structure.

FIGURE 7.3.1 MINIMUM HORIZONTAL CLEARANCE DISTANCES (M)

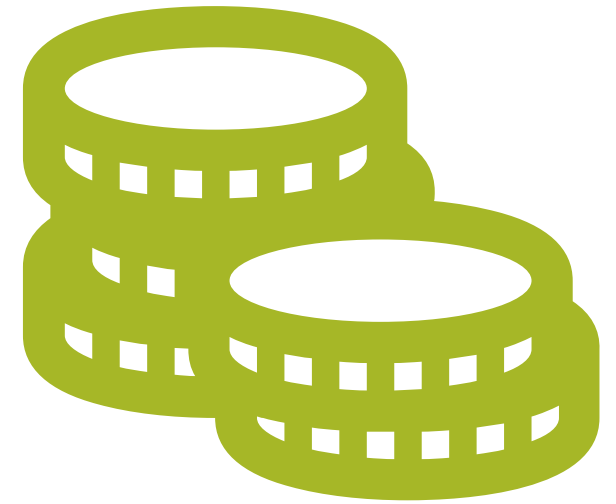


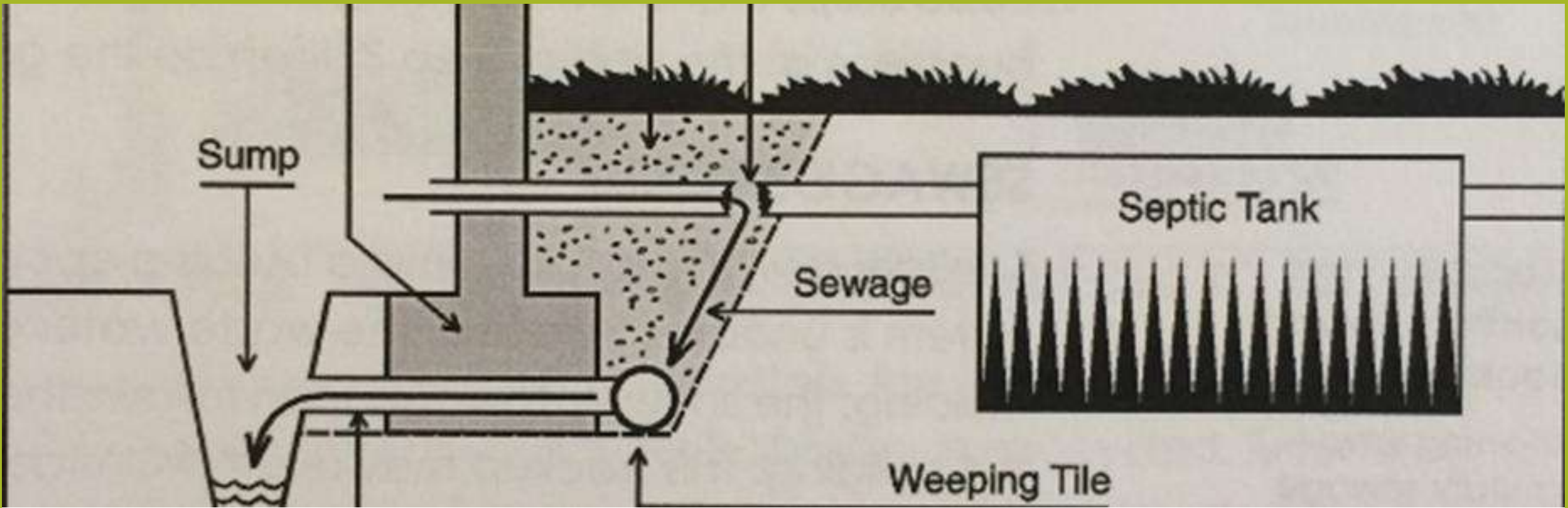
OPERATION AND MAINTENANCE

Who is responsible? YOU ARE

Malfunctions

- Present a public health and environmental risk
- Symptoms:
 - Foul Odor
 - Sanitary Sewage Backup
 - Sanitary Sewage Breakout
 - Groundwater Contamination





ODOR

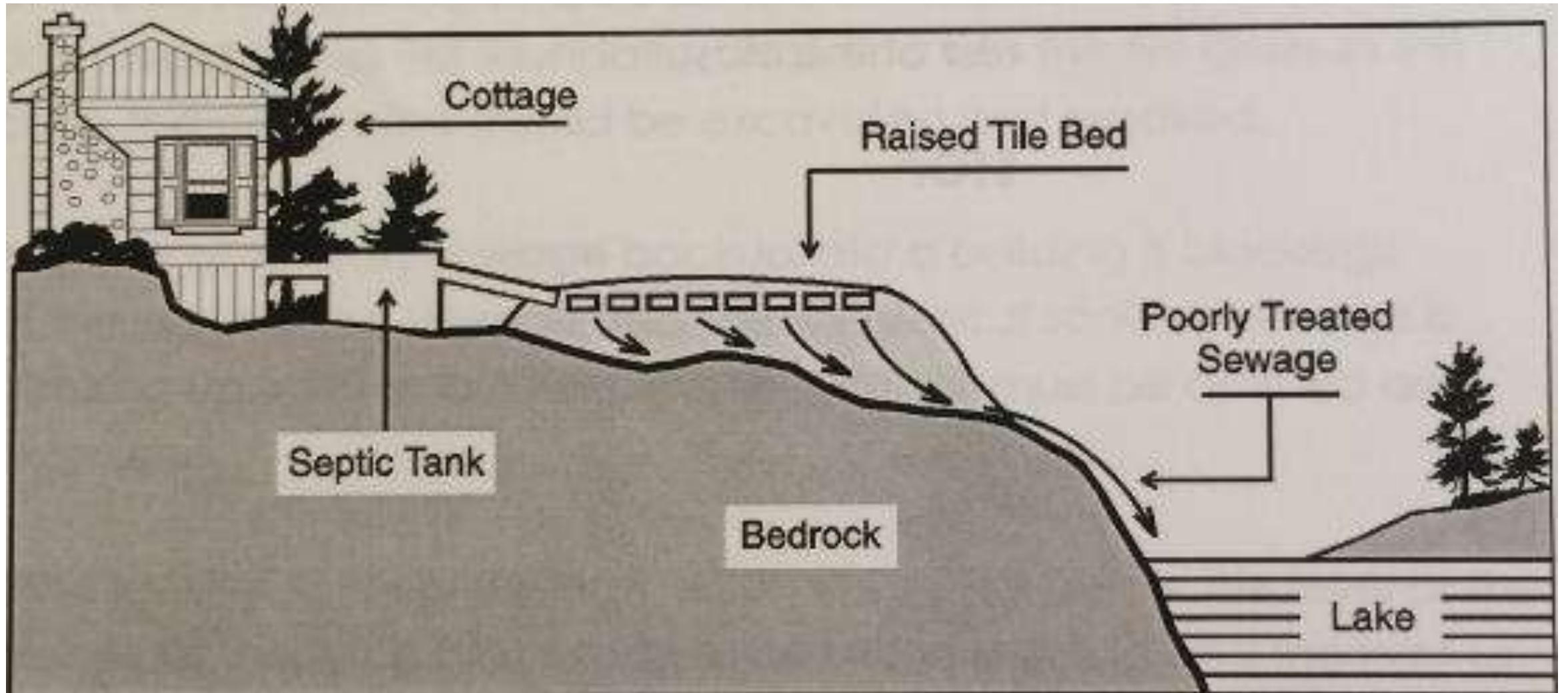
SEWAGE BACKUP

An aerial photograph of a sewage treatment plant. The central feature is a large, circular, light-colored tank. Surrounding it are various pipes, walkways, and other industrial structures. The overall scene is somewhat dark and grainy, suggesting it might be a night or low-light shot. The text 'SEWAGE BREAKOUT' is overlaid in large, white, bold letters across the middle of the image.

SEWAGE BREAKOUT

Groundwater Contamination

- It results when:
 - Mounding of the groundwater table occurs
 - The leaching bed has been installed in soils with percolation times less than 1 min/cm
 - The leaching bed has been installed too close to the high groundwater table.



Conclusion

- Questions?
- Contact Information
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Email: Brittany.Pellerin@exp.com

Reference

Information and images found within this Power Point have been taken from the Ontario Building Code 2012 (O. Reg. 332/12) and the On-Site Sewage Systems 2012 Workbook Edition 3.