On-Site Sewage Systems (Wastewater Systems), Part 8 and Public Health

Environmental Public Health Services





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Senior Environmental Public Health Officer

Public Health Impacts of Untreated Wastewater

- How you can prevent the spread of communicable diseases?
- How you can prevent contamination of clean water?

On-Site Sewage Systems

- Types of Sewage Systems
- Recommendations for installation and maintenance
- Troubleshooting

Part 8

- Ontario Building Code
- Part 8

First Nations Public Health

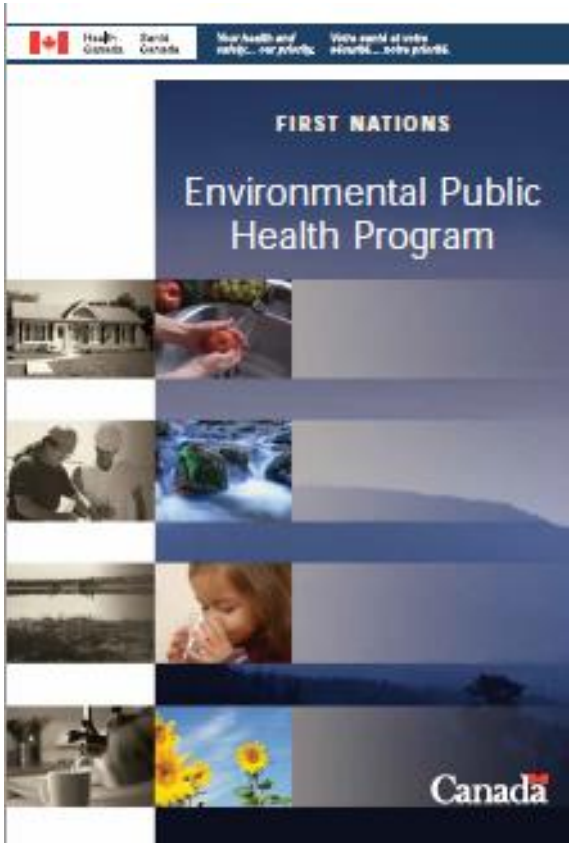
The First Nations and Inuit Health Branch (FNIHB) provides a suite of public health programs and services either through direct service delivery by staff or through funding agreements with communities or organizations.

FNIHB will fund or deliver:

- Community-based health promotion and disease prevention programs.
- Primary, home and community care services.
- Services to control communicable disease and environmental public health issues.
- Non-insured health benefits.

Program Objective

The Environmental Public Health Program **works to identify and prevent environmental public health risks that could negatively impact the health of First Nations** community residents and to recommend corrective action to reduce these risks.



Guiding Principles

1. **Work with First Nations communities as active partners** in the Environmental Public Health Program.

2. **Collaborate with** public health workers, provincial and local health authorities, First Nations organizations and other federal, provincial and municipal departments and agencies when delivering environmental public health programming in First Nations communities.

3. **Strive for a level of on-reserve environmental public health services** that is comparable to that available off-reserve and consistent from region to region.

Role of Environmental Public Health Officers

- EPHOs (formerly know as EHOs) provide advice, guidance, education, public health inspections and recommendations to First Nations to help manage public health risks associated with the environment.
- Gather data to analyse what steps can be taken to promote public health in First Nation communities.
- Can be employed by Indigenous Services Canada - FNIHB or First Nation organizations.
- All EPHOs **must be certified with the Canadian Institute of Public Health Inspectors**.

Ontario EPHS Organization

Sioux Lookout

- 31 First Nations
- 1 Senior EPHO - Sioux Lookout
- 5 EPHOs: all in Sioux Lookout

Thunder Bay West

- 39 First Nation communities
- 1 Senior EPHO - Thunder Bay
- 3 EPHOs: Fort Frances, Thunder Bay (2)
- 1 transferred EHO serving Kenora area First Nations

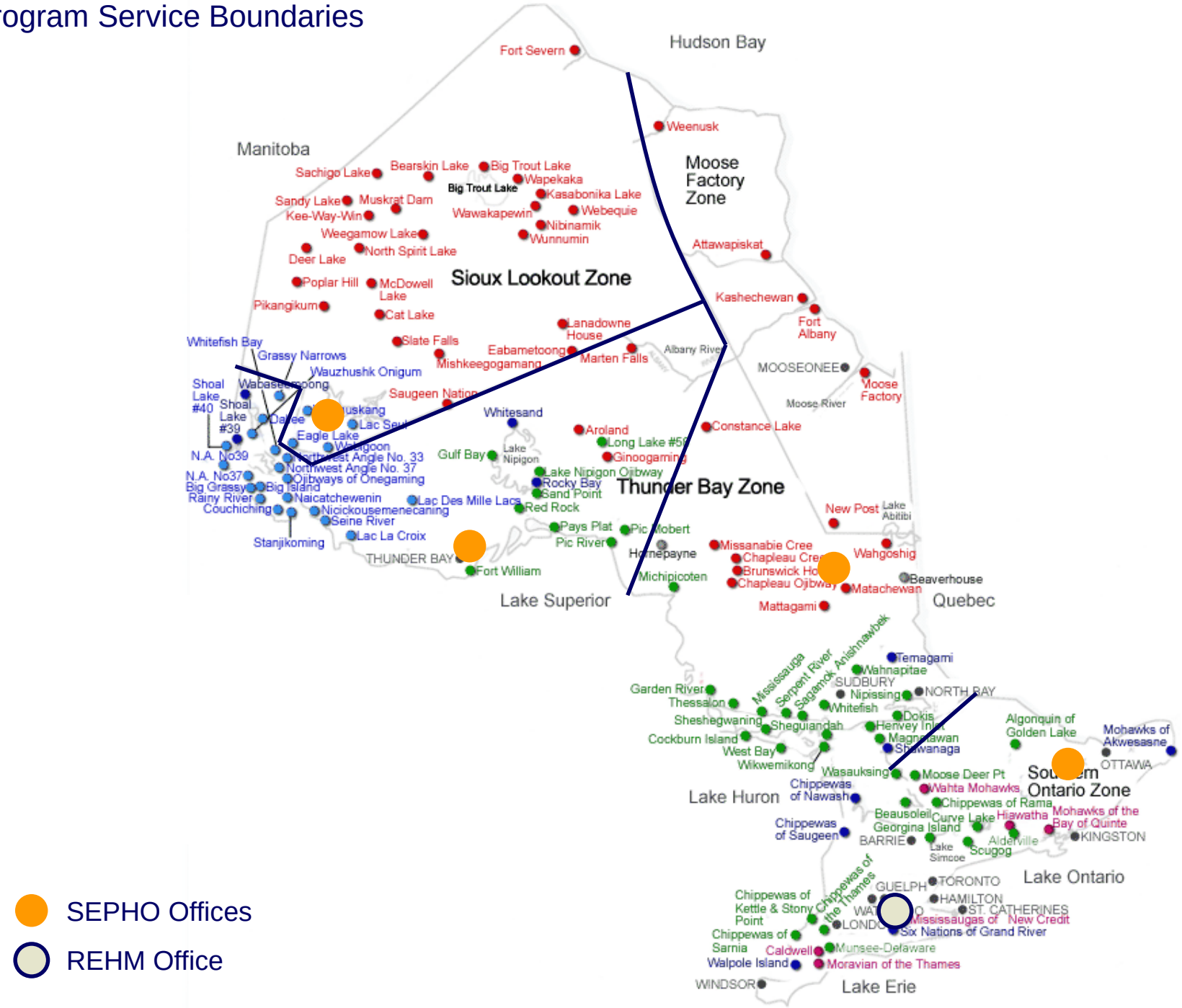
Thunder Bay East

- 39 First Nation communities
- 1 Senior EPHO – Timmins
- 5 EPHOs: Sault Ste Marie, Sudbury(2), Timmins(2)

Southern Ontario

- 25 First Nations
- 1 Senior EPHO - Ottawa
- 4 EPHOs: London, Brantford, Washago, Peterborough
- 1 transferred EHO serving Akwesasne

Program Service Boundaries



SEPHO Offices

REHM Office

Core Programs

- Drinking Water
- Food Safety
- Health and Housing
- Wastewater

- Solid Waste Disposal
- Facilities Inspection
- Communicable Disease Control
- Emergency Preparedness and Response

Wastewater

Wastewater, also known as sewage, can be harmful to humans as it is capable of spreading diseases and polluting surface and groundwater sources.

The Environmental Public Health Program identifies existing and potential hazards associated with wastewater disposal in order to reduce and prevent public health risks.

Program activities focus on community wastewater treatment plants as well as on-site sewage disposal systems.

What is Wastewater?

- Wastewater is used water which is contaminated with human waste, food wastes, and chemical wastes.
- Also referred to as sewage.
- What is the composition of wastewater and how it can negatively impact receiving water bodies and community health?

Disposal of Wastewater

Proper disposal of wastewater is beneficial to the community in numerous ways:

- Protection of river/streams/lakes/oceans from pollution
  - Which in turn can affect fish populations and promote weeds/algae
- Protection of the community drinking water sources
  - Prevention of communicable diseases
- Protection of recreational water areas
- Employment opportunities

Composition of Wastewater

- Mainly composed of wastes generated from bathrooms, kitchens, and laundry
    - Toilets, showers, sinks, dishwasher, washing machines (greatest impact)
    - Can further breakdown to the fixture that generates the wastes:
        - Blackwater (toilets)
        - Greywater (all sources except toilets)

- Small amounts of solid waste products
    - organic material of animal and vegetable origin
    - the solid waste products will eventually decay/decompose
    - organic material needs to be converted to a form which will not cause the spread of disease or pollute water

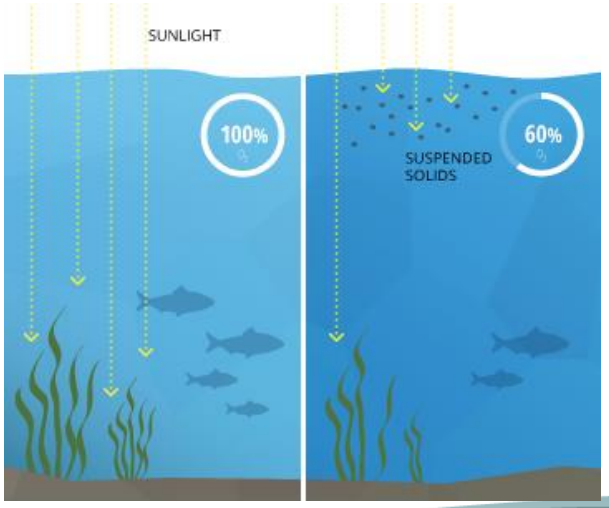
Impacts on Public Health - Pollutants in Untreated Wastewater

Suspended Solids:

- Particles of many different sizes
- Usually invisible to the naked eye

What happens when wastewater with high suspended solids are discharged/spilled into waterbodies such as lakes and rivers?

- Larger particles sink
- Smaller particles will stay suspended
- Cause cloudiness (turbidity)
- High turbidity blocks sunlight
- Can inhibit growth of plants and other species
- Aesthetically displeasing



https://www.fondriest.com/environmental-measurements/parameters/water-quality/turbidity-total-suspended-solids-water-clarity/

SHARAF, A. *Code Reference Series On-Site Sewage Systems based on Ontario Building Code 2012*, Queen's Printer for Ontario, 2014.

Impacts on Public Health - Pollutants in Untreated Wastewater

Biodegradable organics (BOD):

- the amount of dissolved oxygen used by microorganisms in the biological process of metabolizing (breaking down) organic matter
- The more organic = the greater the BOD

What happens when wastewater with high BOD are discharged/spilled into waterbodies such as lakes and rivers?

- The greater the BOD = the lower the amount of dissolved oxygen in receiving water
- Aerobic organisms will consume the oxygen to break down all of the organic matter
- The depletion of oxygen creates harmful conditions for aquatic life
- Creates taste and odour problems
- The BOD is therefore a reliable gauge of the organic pollution of a body of water

SHARAF, A. *Code Reference Series On-Site Sewage Systems based on Ontario Building Code 2012*, Queen's Printer for Ontario, 2014.

Impacts on Public Health - Pollutants in Untreated Wastewater

Biological Hazards - Pathogens (Disease Causing Microorganisms):

- Parasites, bacteria and viruses are harmful to humans and are a cause of communicable disease
- Also contains many bacteria – billions!! Most are harmless or non-pathogenic
- Bacteria are useful because they decompose the organic material in the wastewater
- Form the basis of any biological treatment

What happens when wastewater with pathogens are discharged/spilled into waterbodies such as lakes and rivers?

  - Untreated wastewater (or partially treated) can lead to illness through direct/indirect contact or ingestion of contaminated water or shellfish
  - Viruses are generally more infectious and more resistant to treatment (Hepatitis)
  - Parasites are also more resistant to treatment

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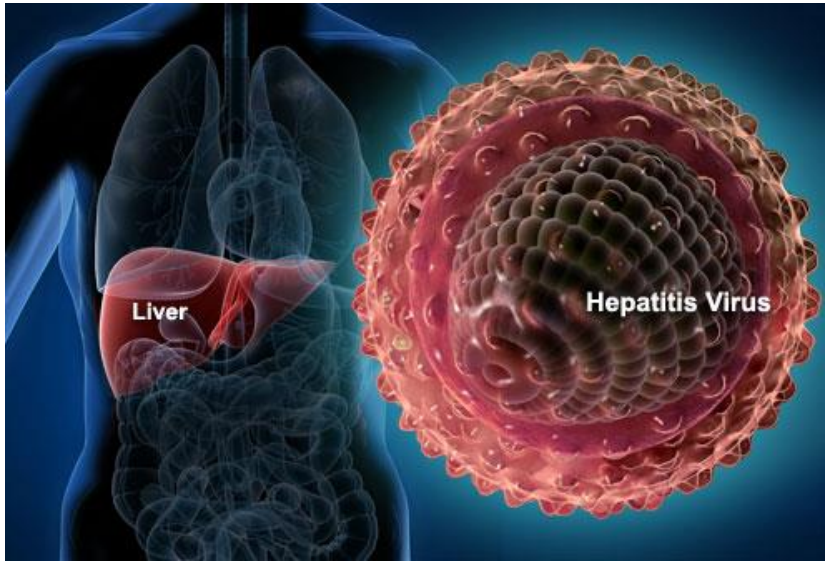
Impacts on Public Health - Pollutants in Untreated Wastewater

Biological Hazards - Pathogens (Disease Causing Microorganisms):

- Disease causing microorganisms.
- The main route of exposure is hand to mouth contact.
- Breathing in a suspension of particles (aerosols) is a less common means of exposure but may occur whenever sewage is agitated (E.g.. Near incoming wastewater inlets).



http://www.webmd.com/hepatitis/ss/slideshow-hepatitis-overview17

Work Safe Alberta – Workers Exposure to Sewage Bulletin
http://work.alberta.ca/documents/GH017.pdf

Impacts on Public Health - Pollutants in Untreated Wastewater

Nitrogen:

- Nitrogen sources can be septic systems and agricultural run off
- Health and environment concern
- Eutrophication:
  - excessive richness of nutrients in a body of water
  - excessive plant growth (algae, rooted aquatic vegetation)

What happens when wastewater with high nitrogen is discharged/spilled into waterbodies such as lakes and rivers?

- Eutrophication can lead to the decay of fresh water resources
- Negatively impact recreational use
- Aesthetically displeasing
- Nitrate-nitrogen in drinking water can cause serious health issues in infants
- Livestock may also have health impacts from drinking water high in Nitrogen

SHARAF, A. *Code Reference Series On-Site Sewage Systems based on Ontario Building Code 2012*, Queen's Printer for Ontario, 2014.

Impacts on Public Health - Pollutants in Untreated Wastewater

Phosphorus:

- Limiting factor in plant growth in freshwater ecosystems
- Adding phosphorus increases algae growth
- Principal cause of Eutrophication:
  - excessive richness of nutrients in a body of water
  - excessive plant growth (algae, rooted aquatic vegetation)

What happens when wastewater with high phosphorus is discharged/spilled into waterbodies such as lakes and rivers?

- Eutrophication can lead to the decay of fresh water resources
- When the algae die they sink into the bottom and decompose
- Decomposition process eats up oxygen and deprives the deeper waters (killing fish and other organisms)

Environmental Public Health Assessment – On Site Sewage Systems

How do the Environmental Public Health Officers work with First Nations:

- Provide **site and installation inspections** for new and expanded on-site sewage (wastewater) disposal systems.
- Provide **advice, guidance and recommendations related to on-site sewage disposal systems**, including information on appropriate decommissioning of sites.
- **Respond to complaints** by providing public health inspections of existing on-site sewage disposal systems when appropriate.
- **Review plans for new and upgraded on-site sewage disposal systems** from a public health perspective.

Authority and Inspections

- EPHOs do not have authority
- Provide advice and guidance
- Site inspections, review applications and system plants, installation inspections to verify compliance
- Compliance with community standards (BCR) for installation
- In absence of technical requirements at the community level, we recommend compliance with the OBC

Building Code Act, 1992, S.O. 1992, c. 23

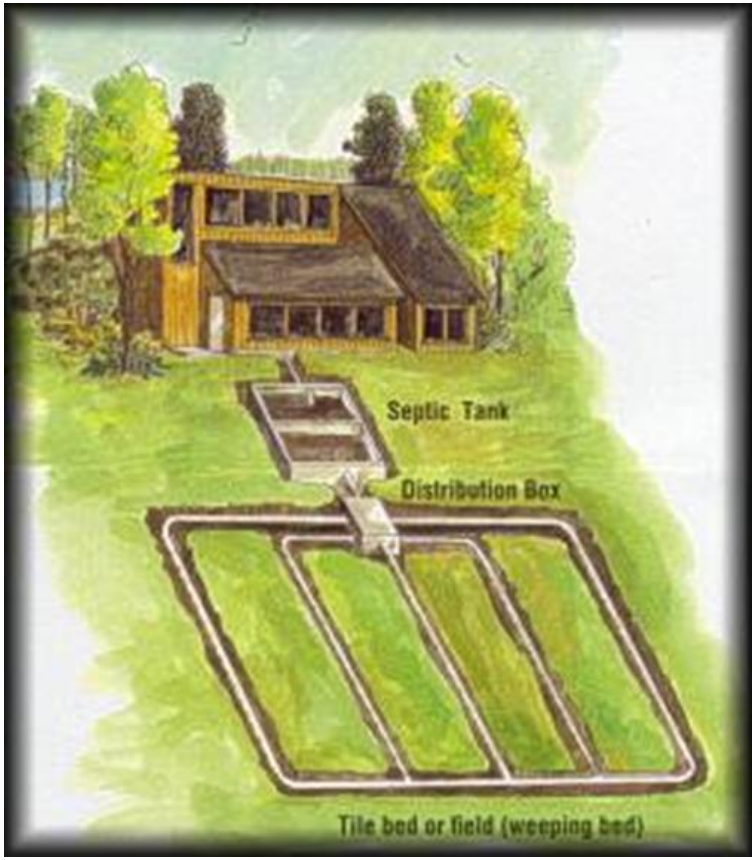
O. Reg. 332/12: BUILDING CODE

Part 8 – Sewage Systems

Recommended that communities work with a licensed on-site sewage system installer

Wastewater Systems – On-Site Sewage Systems

- Sewage system or also called an onsite sewage/septic system
- Onsite treatment that eliminate the need for municipal sewers
- Comprised of a tank, a network of pipes and billions of organisms that process the waste!



http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

Video – Septics 101 A Guide…
0:00 – 5:16

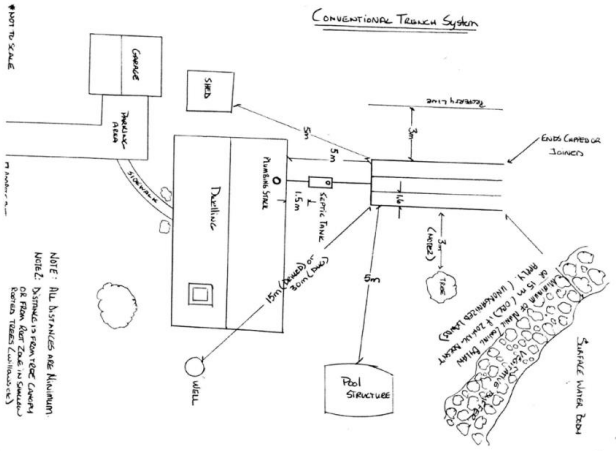
Environmental Public Health Assessment – On-Site Sewage Systems

- On-site assessment is completed
  - Test pits/Percolation tests
  - Review soil analysis
  - Ensuring separation distances
- Review of site plan/application
  - Provide recommendations prior to installation
  - Work with community and contractor
  - Report to Chief and Council
- Inspection of each individual system to ensure proper installation as per the OBC
  - While system is open
  - Observe individual components
- Final Inspection and Report
  - After system is covered and seeded/sodded

On-Site Sewage Systems – THE SITE EVALUATION

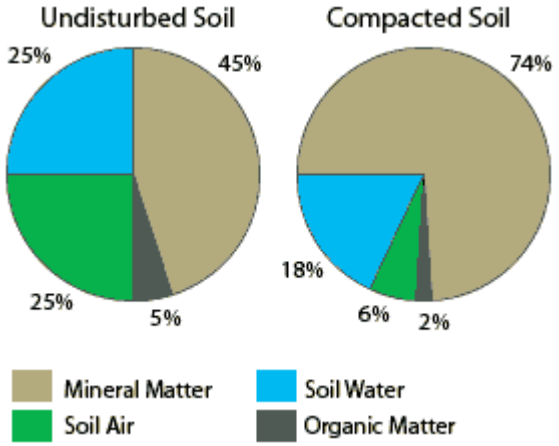
- Site evaluation is a critical part of the process
  - Guide to the types of system that can be installed
  - Some sites will have limitations
  - Soil and site characteristics must be evaluated
    - Topography and landscape (slope, rock depth, drainage, artificial drainage systems)
    - Soil surveys
    - Depth
    - Area
    - Soil permeability

- Diagram of the lot
  - Building lot or house
  - Properties adjacent
  - Other building features
  - Rivers, lakes, streams
  - Wells
  - Setback distances



On-Site Sewage Systems – THE SITE EVALUATION - SOILS

- Soil Profiles and Patterns
  - Valuable information for design
  - Accessible soil surveys?
  - Need to determine the characteristics of the soil
    - This will greatly affect permeability (soil absorption)
  - History of other on-site sewage system failures in the same area?
  - Field visit of property necessary



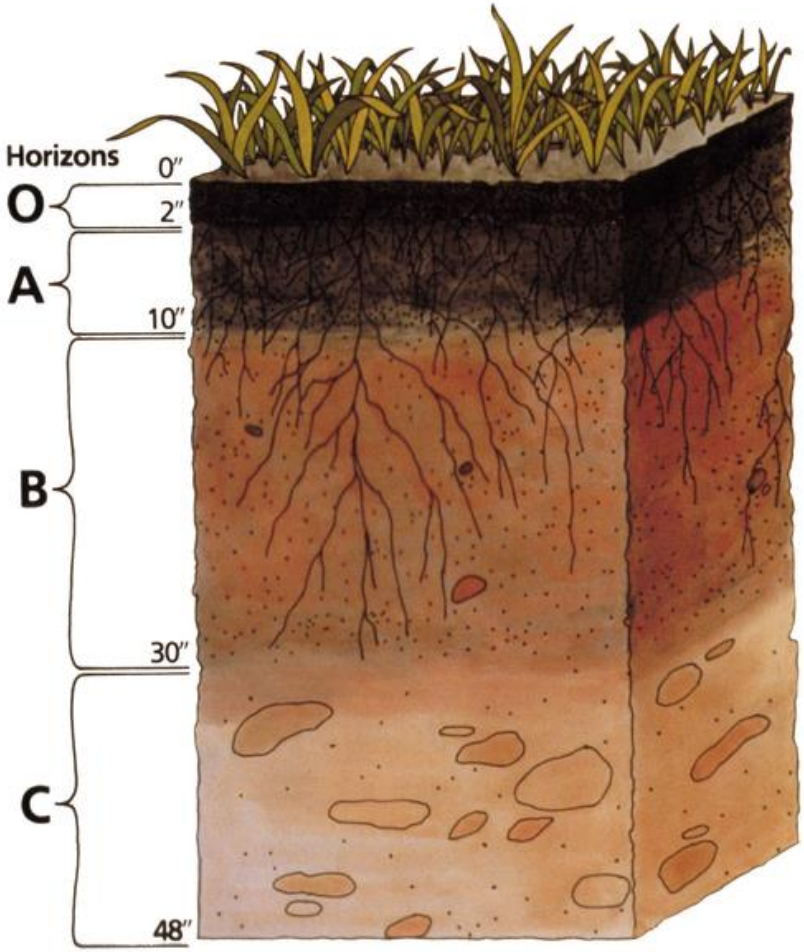
- Soil components
  - Air & Water (50% is porous space)
  - Organic & Mineral

https://www.nrcs.usda.gov/wps/portal/nrcs/mt/water/resources/nrcs144p2_057472/

How easy the wastewater moves through the soil and pore spaces is dependant on the soil characteristics!

On-Site Sewage Systems – THE SITE EVALUATION - SOILS

- Horizons
  - Soils are composed of layers called horizons
  - They are the natural layers, or horizons, in a soil.
  - Each soil series has horizons that are similar in color, texture, structure, reaction, consistency, mineral and chemical composition, and arrangement in the soil profile.
  - The soil profile extends from the surface downward to unconsolidated material. Most soils have three major horizons called the surface horizon, the subsoil, and the substratum.
  - Each horizon will react with effluent from the leaching bed differently



https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/office/ssr7/profile/?cid=nrcs142p2_047970

On-Site Sewage Systems – THE SITE EVALUATION - SOILS

- Field Testing and Test Pits
  - Look for signs of compaction
  - Choose area that appears suitable for leaching bed
  - Soil borings with hand auger or soil probe
  - Size and species of vegetation
    - Information about soil condition
    - Large roots? Alders (indicate high water table)
  - They are the natural layers, or horizons, in a soil.

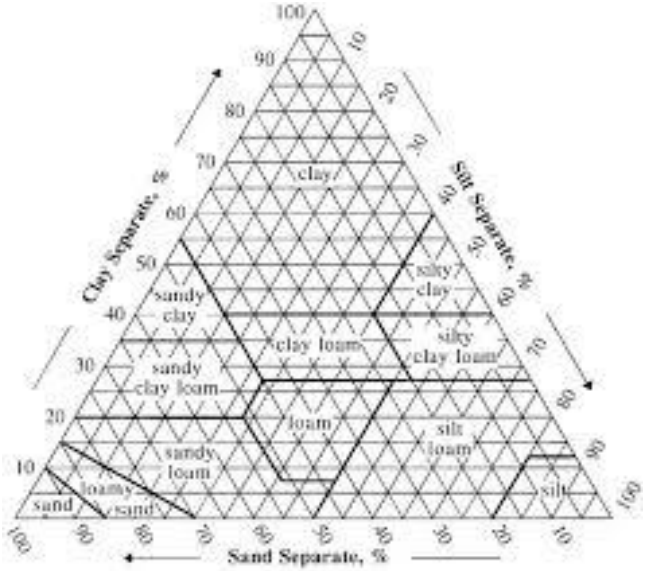
- Test Pits
  - Help determine the soil profile
  - 3-5 test holes
  - Located in area of proposed system
  - Depth of 1.5 meters
  - Ensure no interference with seasonal groundwater fluctuations, rock or impermeable layer
  - Test pit will reveal seasonal soil saturation

http://www.rms.nsw.gov.au/projects/sydney-west/windsor-bridge-replacement/conservation-heritage/archaeological-testing-program.html

On-Site Sewage Systems – THE SITE EVALUATION - SOILS

- Soil Textures
  - The relative proportions of the various size soil particles
  - Size of texture PRIMARY FACTOR in water movement
    - Size of pores around soil particles
  - Aeration and drainage also related to texture
  - Field identification is possible for those experienced (Clay forms thin ribbon when rubbed)

- The Unified Soil Classification System (USCS) is a soil classification system used to describe the texture and grain size of a soil.
  - Determined by soil analysis
  - Called particle-size analysis or sieve analysis



https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_054167

On-Site Sewage Systems – THE SITE EVALUATION - SOILS

- Soil Colour
  - Colour patterns can indicate how much water is in the soil
  - Mottling (various shades of gray, brown, and yellow) indicates periodic saturation and will help determine if there is a seasonably high ground water table
  - Good drainage soil (soil that allows air to enter) will have colours of brown, yellow or red due to iron being oxidized
  - Dark colours indicate higher amounts of organic matter
- Percolation Time (T-time)
  - Average time it takes water to drop one centimeter during a test
  - Used to be more commonly used for sizing the sewage system
  - The percolation time of soil should be estimated from the soil analysis or by performing a percolation test

On-Site Sewage Systems – Classification of Sewage Systems

8.1.2.1. Classification of Systems

(1) All *sewage systems* shall be classed as one of the following:

(a) Class 1 — a chemical toilet, an incinerating toilet, a recirculating toilet, a self-contained portable toilet and all forms of privy including a *portable privy*, an *earth pit privy*, a *pail privy*, a *privy vault* and a composting toilet system,

(b) Class 2 — a *greywater* system,

(c) Class 3 — a cesspool,

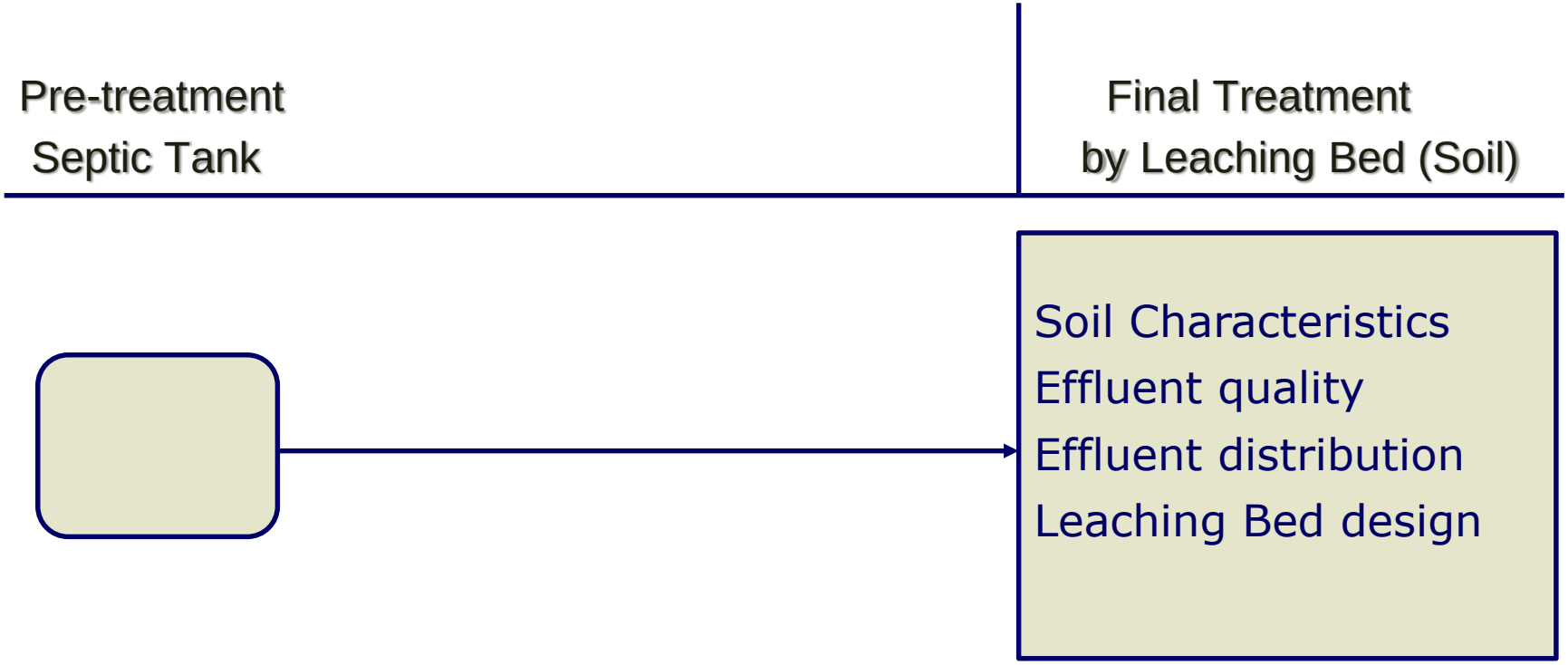
(d) Class 4 — a *leaching bed* system, or

(e) Class 5 — a system that requires or uses a *holding tank* for the retention of *hauled sewage* at the site where it is produced prior to its collection by a *hauled sewage system*.

Video – Your Septic System SepticSmart! Series

(entire video)

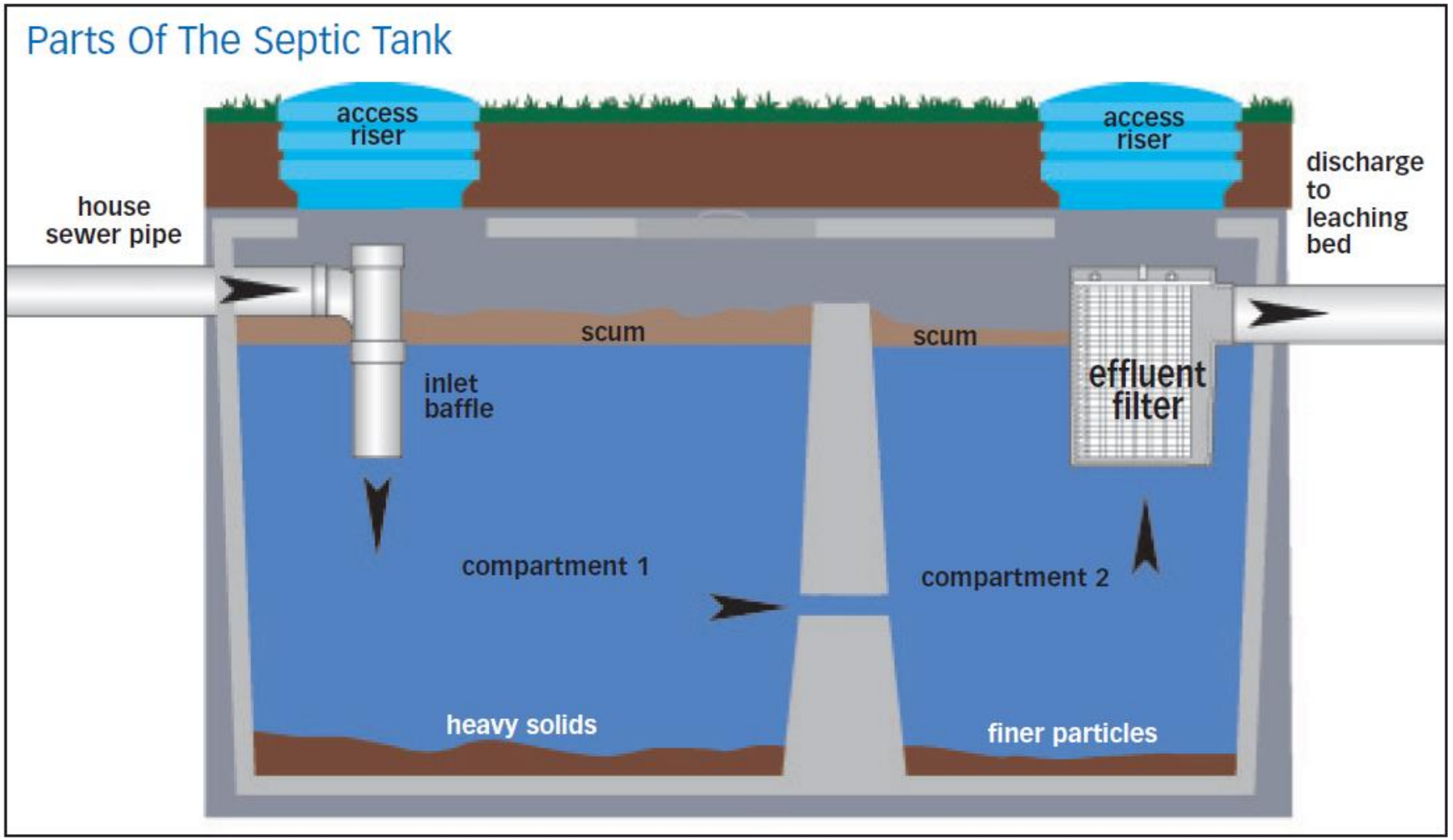
On-Site Sewage Systems – TREATMENT OF WASTEWATER



On-Site Sewage Systems – THE TANK

- All household wastewater exits your home through an underground pipe that leads to the buried **septic tank**.
- The waste flows to the first compartment of the tank
  - where the heavy solids settle and the lighter materials (fats, oils and grease) float to the top as scum.
- Baffles and screens keep this scum layer from escaping the tank and flowing to the leaching bed. This scum is removed when the tank is pumped during regular maintenance
- In the second compartment of the tank, finer particles settle to the bottom. Organic materials break down in the tank.
- On newer systems, any remaining organic material is trapped and decomposes on a screen called the effluent filter located at the outlet of the tank.
  - As of January 2007, effluent filters became mandatory in Ontario

On-Site Sewage Systems – THE TANK



http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

On-Site Sewage Systems – THE TANK

- Minimum residential – 3600L (1000USG)
- Sized to accommodate peak flows
- 2 times the daily flow for residential
- Effluent filters NSF/ANSI 46 – will protect the leaching bed soils
- BOD reduction of 30-50%
- 50% of solids in the tank decompose/50% accumulate in tank

http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

SHARAF, A. *Code Reference Series On-Site Sewage Systems based on Ontario Building Code 2012*, Queen's Printer for Ontario, 2014.

On-Site Sewage Systems – THE LEACHING BED

- From the tank, the effluent moves to a leaching bed of perforated PVC drain pipes.
- Stone and a layer of unsaturated native soil or imported sand surround these pipes.
- The effluent flows to the leaching bed
  - either by gravity or
  - pump
- The leaching bed's perforated PVC drain pipes disperse the effluent, allowing the liquid to seep into the ground where bacteria and other organisms process the wastewater.
- Soils below the stone in the trench bottom act as a biological, chemical, and physical filter to remove most remaining organic and biological contaminants.

Did You Know?

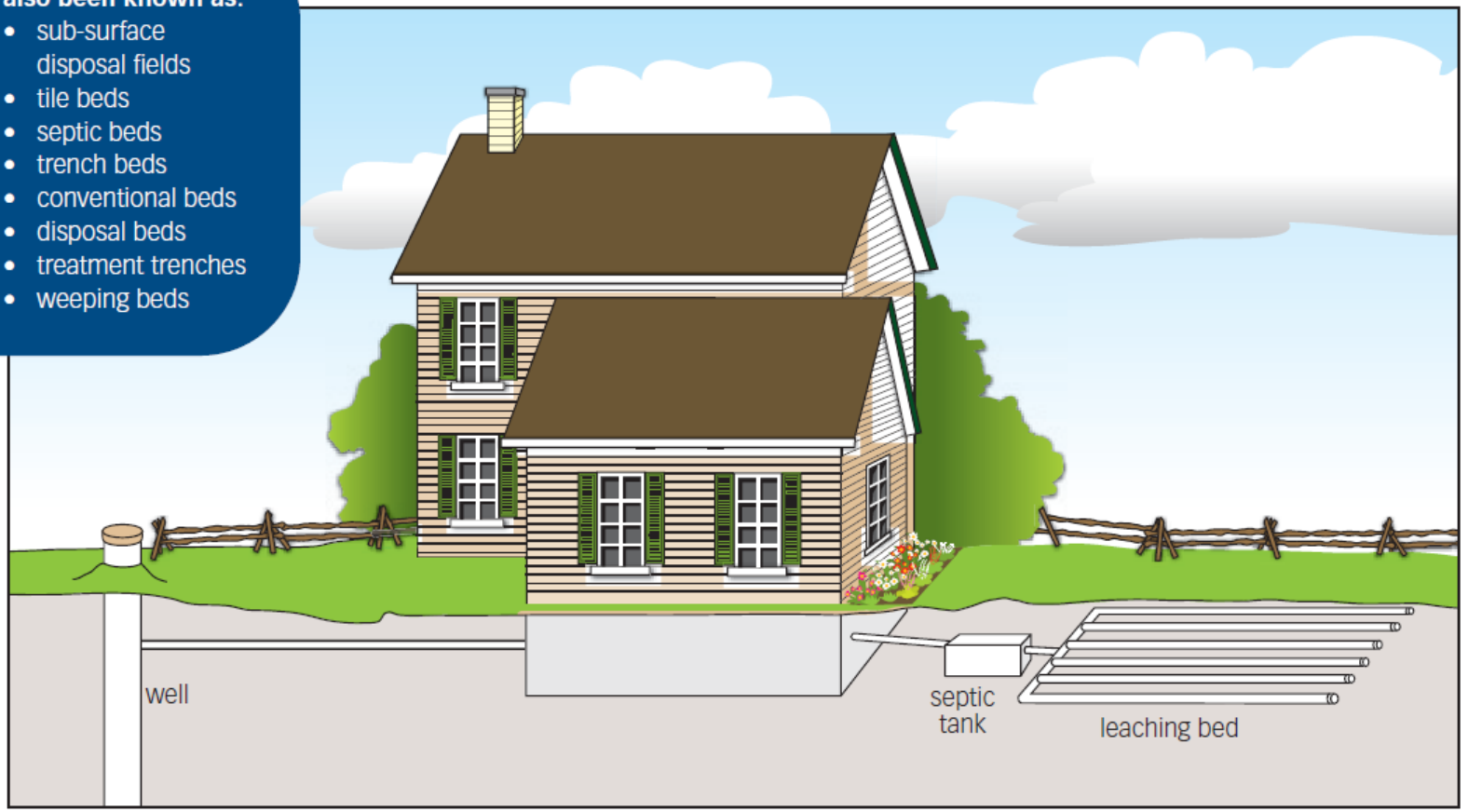
The soil under the stone in the trench bottom of a properly working system can remove 99 percent of the *E.coli* for every 30 centimetres (12 inches) of unsaturated soil.

http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

On-Site Sewage Systems – THE LEACHING BED

Leaching beds have also been known as:

- sub-surface disposal fields
- tile beds
- septic beds
- trench beds
- conventional beds
- disposal beds
- treatment trenches
- weeping beds



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On-Site Sewage Systems – Class 4 Leaching Bed System

- Most common septic system
- Septic tank and leaching bed or a filter bed
- Design is very site specific
  - Flow volumes, space in yard, topography, soil materials, depth to bedrock
  - Proximity to ground and surface waters

On-Site Sewage Systems – Class 4 Leaching Bed System

Leaching bed with gravelless trench technology.

Leaching bed with perforated PVC drain pipes.

Filter media bed.

http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

On-Site Sewage Systems
Class 4 Systems - Leaching Bed vs Filter Beds

Leaching Bed — in-ground leaching bed or raised leaching bed*	Filter Bed — in-ground filter bed or raised filter bed**
Description: • a series of trenches with stone on the trench bottom and perforated PVC drain pipes above • stone and geotextile fabric cover the drain pipes • backfilled with sand and topsoil • the length and number of absorption trenches depends on percolation rate of the native soil and daily sewage design flow	**Description:** • no trenches, one large bed • the bed is prepared with a special "filter sand" that is a specified grain size to allow for optimum percolation while treating the effluent • perforated PVC drain pipes are laid on a continuous stone layer over the filter media sand
Advantages: • less expensive because you can use native soil as backfill • usually a gravity-fed system where no pumps are required	**Advantages:** • the system is smaller making it ideal for small lots where separation distances may be an issue
Disadvantages: • space may be an issue on smaller lots • may be hard to find good quality stone for absorption trenches • raised leaching beds are more expensive than the in-ground type because imported sand is required to construct the trenches • raised leaching beds require increased separation distances	**Disadvantages:** • filter sand is costly because it is hard to find and in most cases needs to be processed to a specific criteria • can't process heavy flows as effectively as a conventional bed • raised filter beds are more expensive than the in-ground type because imported sand is required to construct the bed • raised filter beds require increased separation distances
* *Raised leaching beds are the same as in-ground leaching beds except they are above existing grade. Raised beds are built above grade because regulations require certain separation distances between the bottom of the absorption trenches and high groundwater levels, bedrock or impervious soils.*	** *Raised filter beds are the same as in-ground filter beds except they are above existing grade. Raised beds are built above grade because regulations require certain separation distances between the bottom of the absorption trenches and high groundwater levels, bedrock or impervious soils.*

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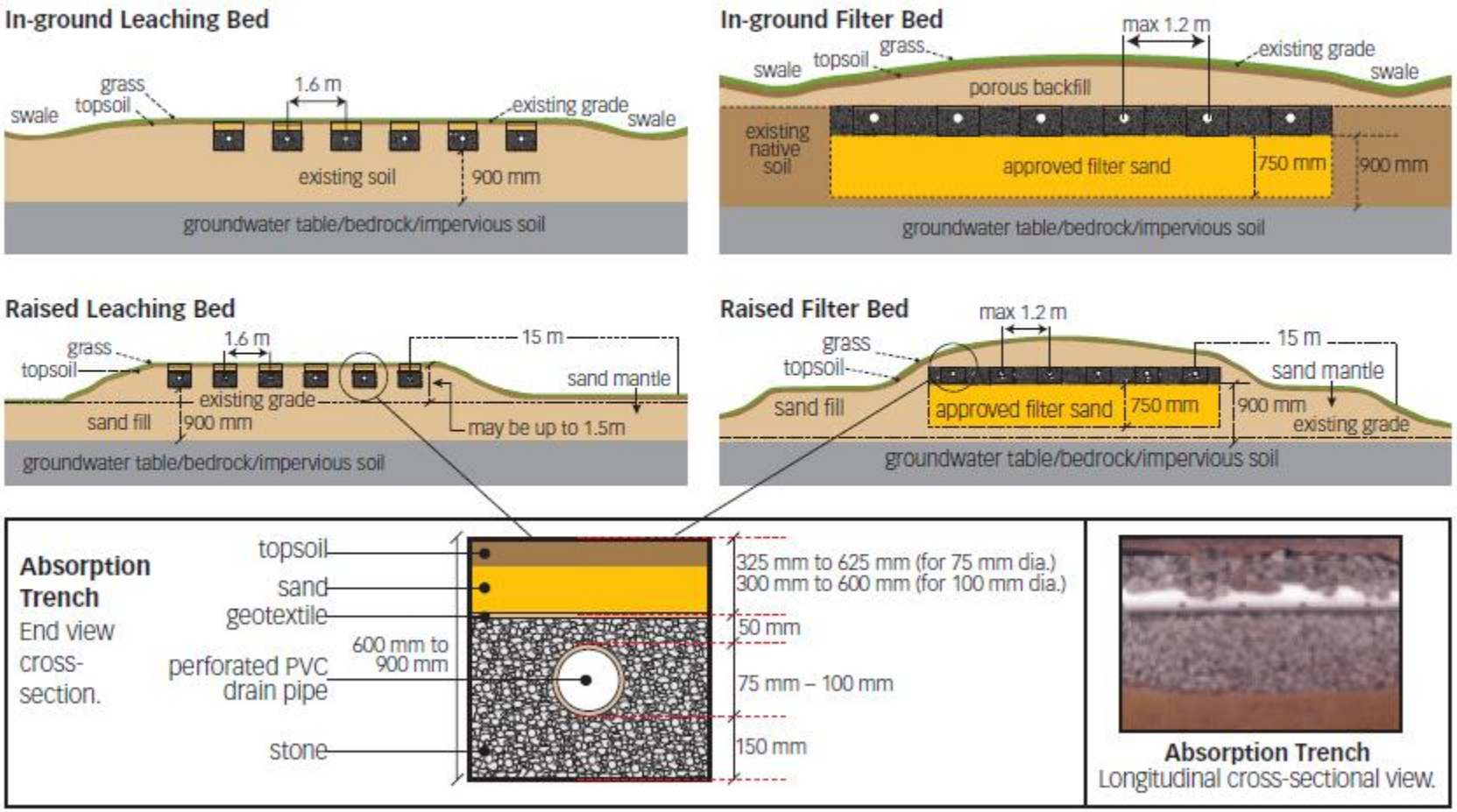
On-Site Sewage Systems
Class 4 Systems - Leaching Bed vs Filter Beds



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Video – Septics 101 A Guide…
5:16 – 12:05

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(d) Class 4 — a *leaching bed* system, or

(e) Class 5 — a system that requires or uses a *holding tank* for the retention of *hauled sewage* at the site where it is produced prior to its collection by a *hauled sewage system*.

On-Site Sewage Class 4 Systems – Clearance Distances

Clearance Distances for Class 1, 2 and 3 Sewage Systems

Item	Column 1 Sewage System	Column 2 Minimum horizontal distance in metres from a well with watertight casing to a depth of at least 6 m	Column 3 Minimum horizontal distance in metres from a spring used as a source of *potable* water or well other than a well with a watertight casing to a depth of at least 6 m	Column 4 Minimum horizontal distance in metres from a lake, river, pond, stream, reservoir, or a spring not used as a source of *potable* water	Column 5 Minimum horizontal distance in metres from a property line
1.	Earth Pit Privy	15	30	15	3
2.	Privy Vault	10	15	10	3
	Pail Privy				
3.	*Greywater* System	10	15	15	3
4.	Cesspool	30	60	15	3

Minimum Clearances for Holding Tanks

Item	Column 1 Object	Column 2 Minimum Clearance, m
1.	Structure	1.5
2.	Well with a watertight casing to a depth of at least 6 m	15
3.	Any other well	15
4.	Spring	15
5.	Property Line	3

On-Site Sewage Class 4 Systems – Clearance Distances

Minimum Clearances for Treatment Units

Item	Column 1 Object	Column 2 Minimum Clearance, m
1.	Structure	1.5
2.	Well	15
3.	Lake	15
4.	Pond	15
5.	Reservoir	15
6.	River	15
7.	Spring	15
8.	Stream	15
9.	Property Line	3

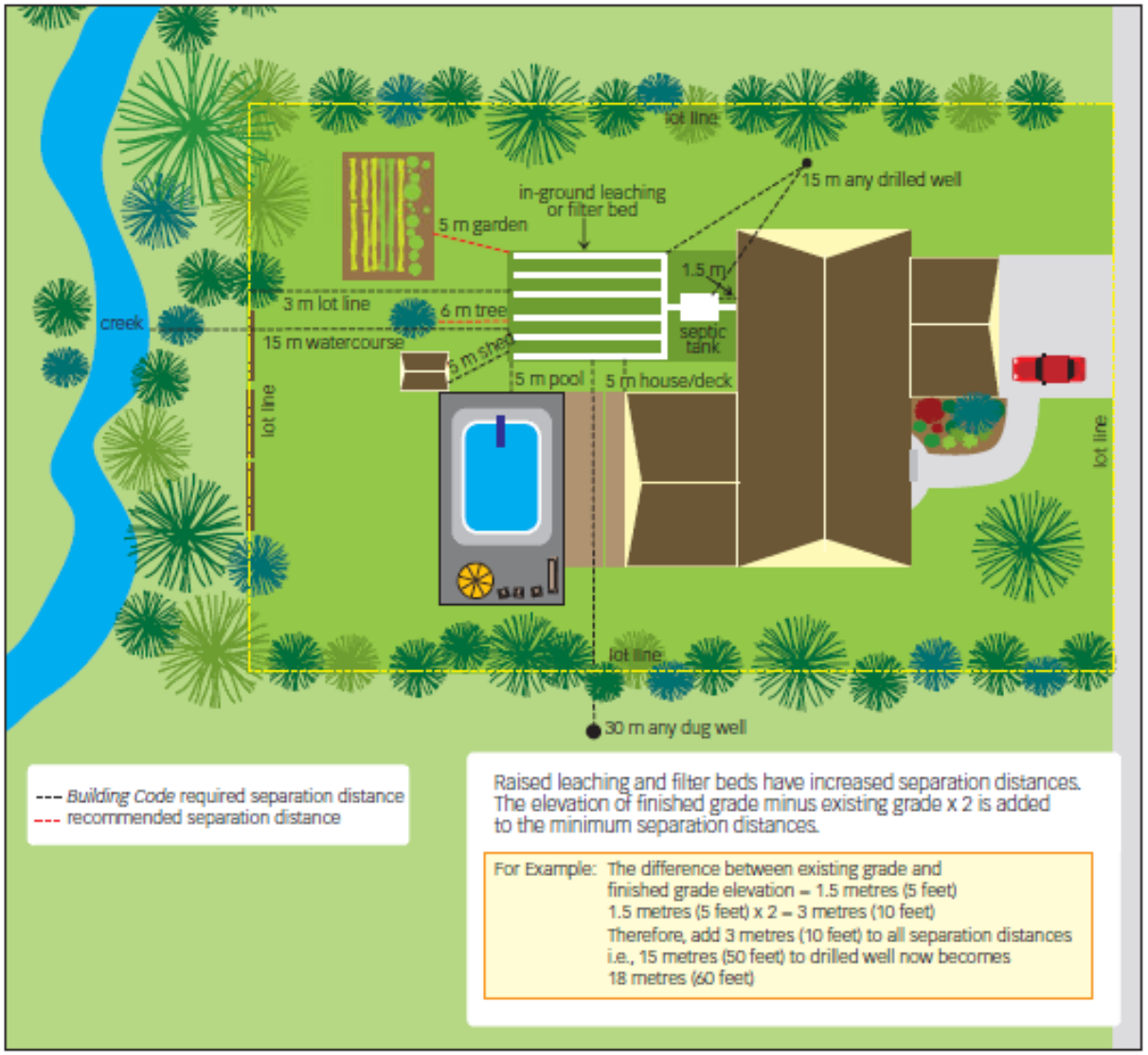
On-Site Sewage Class 4 Systems – Clearance Distances

Minimum Clearances for Distribution Piping

Item	Column 1 Object	Column 2 Minimum Clearance, m
1.	Structure	5
2.	Well with a watertight casing to a depth of at least 6 m	15
3.	Any other well	30
4.	Lake	15
5.	Pond	15
6.	Reservoir	15
7.	River	15
8.	Spring not used as a source of *potable* water	15
9.	Stream	15
10.	Property Line	3

On-Site Sewage Class 4 Systems – Clearance Distances

Minimum Separation Distances For Leaching Or Filter Beds



http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

On-Site Sewage Systems

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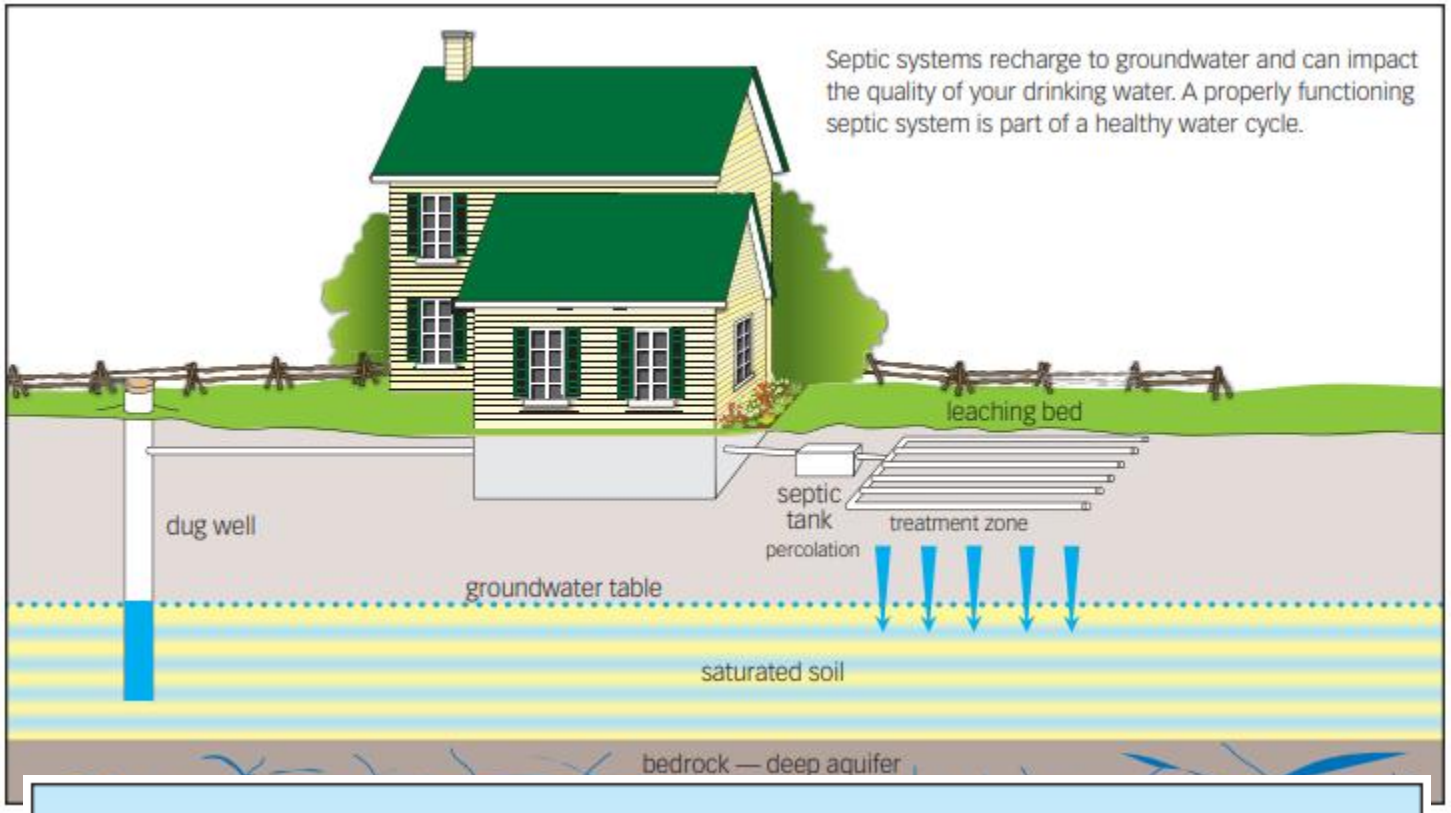
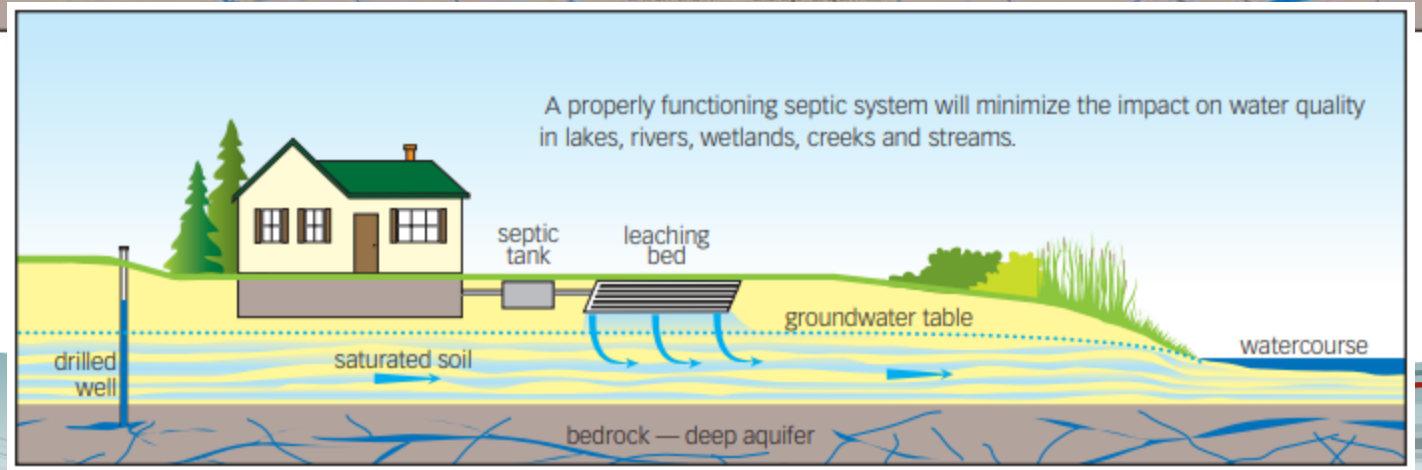




On-Site Sewage Systems – Recommendations for Selecting Installer

- Knowledgeable about local conditions
- Local for logistical and economical reasons
- Licenced as installer with BCIN #
  - *FAQ about Licensing Requirements Handout
- Conducts field assessments of lots, digs test pits
- Provides lab reports regarding
  - soil sieve test results, soil classification and T-time
- Designs system within parameters of the OBC, functionality, realistic housing conditions (daily flow?)
- Completes application on behalf of Band
- Installs system as per the OBC
  - participates in inspection process
- Provide report/records to the community representatives
- Provide educational materials to residents

Maintenance of On-site Sewage Systems – The “DO” list

- keep the tank access lid secured to riser and lids are securely fastened
- keep area grassed and mowed
- keep system diagram in a safe place for reference
  - keep accurate records of septic system maintenance and service calls
- test your well water at least three times a year —spring, summer and fall
- have your tank inspected for sludge and scum buildup on a regular basis (3-5 years) and pump out when a third of the depth of your tank is full of sludge and scum
- have your effluent filter checked and cleaned every year; if you don’t have an effluent filter, consider adding one
- divert surface water away from your leaching bed
- conserve water in the house to reduce the amount of wastewater that must be treated
  - repair leaky plumbing fixtures
  - replace inefficient toilets with low-flush models
  - spread the number of loads of laundry throughout the week
- consider installing a lint filter on your washing machine’s discharge pipe
- visually inspect the field – sanitary surveys conducted annually by First Nations

Maintenance of On-site Sewage Systems – The “DON’T” list

- **Never** enter a septic tank — gases and lack of oxygen can be **fatal**
- put cooking oils or food waste down the drain
- flush hazardous chemicals, pharmaceuticals, cigarette butts or sanitary products
- flush wet wipes
- use special additives that are claimed to enhance the performance of your tank or system — you don’t need them!
- dig without knowing the location of your leaching bed
- drive or park over your tank or leaching bed (snowmobiles, pools)
- pave over your leaching bed
- allow livestock on the leaching bed
- plant trees or shrubs too close to the septic tank or leaching bed
- connect rain gutters, storm drains, sump pumps or allow surface water to drain into a septic system
- discharge water softener backwash to the septic system unless your system has been designed for it
- drain hot tub and spa water to the septic system

Video – Your Septic System SepticSmart! Series

(entire video)

Video – Septics 101 A Guide…
12:05-15:54

Troubleshooting On-site Sewage Systems

- Lifespan of 15-40 years
- Symptoms:
  - Smell – foul rotten egg
  - Household drains slow
  - Toilets back up
  - Tank overflows
  - Grass over sewage system is unusually green and/or spongy
  - Surface ponding of effluent (liquid leaching out)
  - Bacteria or nitrate contamination can show up in well water
- Repairs can range:
  - cleaning a few lines
  - replacing entire leaching beds
  - removing contaminated and clogged soils

- **Troubleshooting Guide***

Protecting Workers
Occupational Health and Safety Considerations

- Employers are responsible for selecting, providing and fitting of appropriate PPE for the hazardous exposures in the workplace.
- Education of workers – proper instruction, training and supervision.
- Proper assessment of risk is required, but this should not include analysis of sewage for micro-organisms (constantly changing).
- Exposure to sewage should be eliminated or minimized by, for example, using remote cameras for sewer inspection;
- First aid kits available.

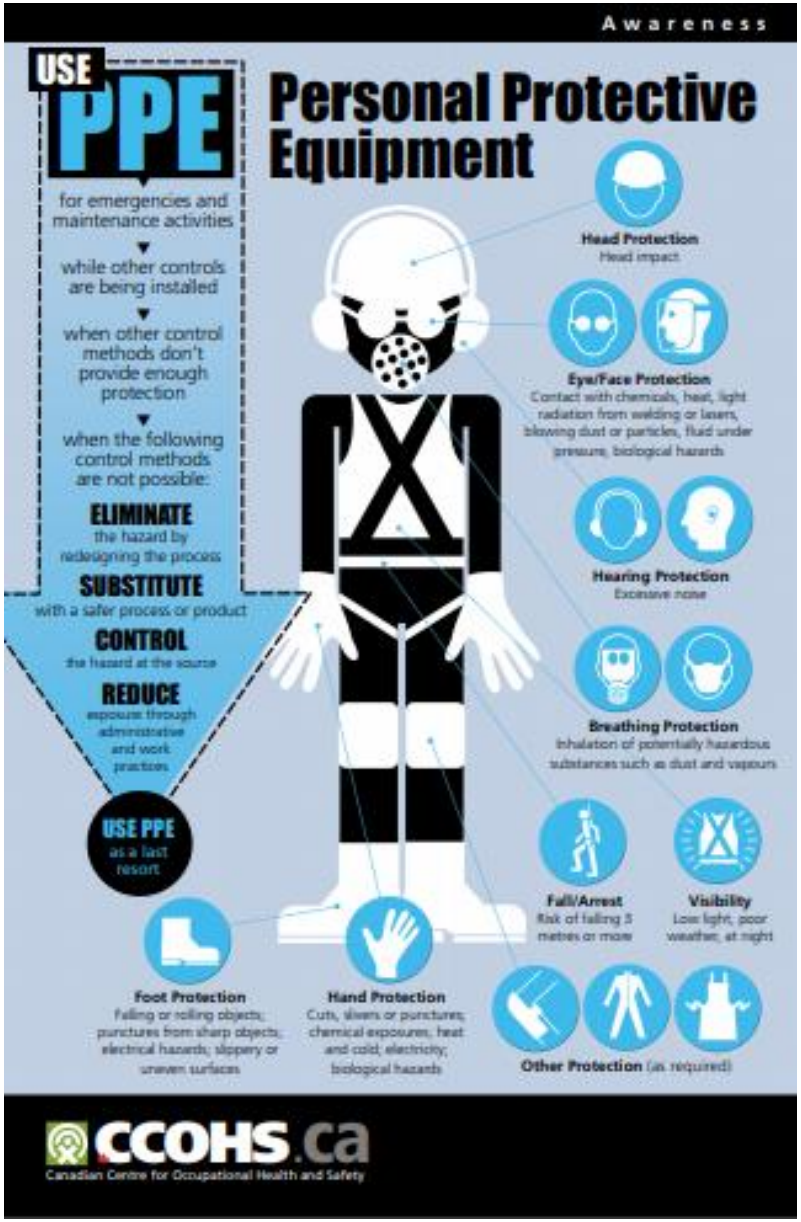
Health Hazards and Sewage

How Do Sewage Microorganisms Enter the Body?

- Hand to mouth contact during eating, drinking and smoking
- Wiping the face with contaminated hands or gloves or by licking splashes from the skin
- Skin contact through cuts, scratches, or penetrating wounds, i.e. from discarded hypodermic needles
- Aerosols landing on surfaces of the eyes, nose and mouth
- By breathing them in, as either dust aerosol or mist

Personal Protective Equipment (PPE)

- PPE should be readily available
- Water-proof boots for sewage spills
- Coveralls for splash proofing your clothes (Tyvek suit)
- Utility Gloves for clean up
- Goggles/mask or face shield for splashes
- Spray Disinfectant (Eg. bleach)
- Provide adequate hand hygiene facilities, including clean water, soap, nailbrushes, disposable paper towels


Awareness
USE PPE
Personal Protective Equipment
for emergencies and maintenance activities
while other controls are being installed
when other control methods don't provide enough protection
when the following control methods are not possible:
ELIMINATE
the hazard by redesigning the process
SUBSTITUTE
with a safer process or product
CONTROL
the hazard at the source
REDUCE
exposure through administrative and work practices
USE PPE
as a last resort
Head Protection
Head impact
Eye/Face Protection
Contact with chemicals, heat, light radiation from welding or lasers, blowing dust or particles, fluid under pressure, biological hazards
Hearing Protection
Excessive noise
Breathing Protection
Inhalation of potentially hazardous substances such as dust and vapours
Fall/Arrest
Risk of falling 3 metres or more
Visibility
Low light, poor weather, at night
Foot Protection
Falling or rolling objects; punctures from sharp objects; electrical hazards; slippery or uneven surfaces
Hand Protection
Cuts, slivers or punctures; chemical exposures; heat and cold; electricity; biological hazards
Other Protection (as required)
CCOHS.ca
Canadian Centre for Occupational Health and Safety

Health Hazards and Sewage

Who Is At Risk?

People who may be at risk of exposure are:

- Employees involved in sewer inspection and maintenance work (unstoppage of sewer lines in large systems)
- Construction workers who repair or replace live sewer lines in large systems
- Sewer spill clean up
- Plumbers
- Anyone exposed to raw sewage

Health Hazards and Sewage

Chemical Hazards

- Sanitary sewers, septic tanks and similar confined spaces containing sewage can sometimes be deficient in **oxygen.**
- They can also **contain flammable gases** such as methane and toxic gases such as carbon monoxide and hydrogen sulphide.
- Carbon monoxide, carbon dioxide, and other exhaust gases may sometimes be present due to a poorly located gasoline engine or generator exhausting into the confined space.

Work Safe Alberta – Workers Exposure to Sewage Bulletin
http://work.alberta.ca/documents/GH017.pdf

Community education:

- Provide public education to home occupants and owners about how to properly maintain an on-site sewage disposal system and reduce risks related to sewage discharge.

- Occupational Health and Safety information/recommendations to communities

- Resources (videos and pamphlets)
  - *SepticSmart! – Understanding Your Home's Septic System Handout

Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

Miigwetch!

Thank you!