# *Site Assessment for Onsite Sewage Systems*

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# Welcome!

- Introductions
- Facilities, breaks, lunch
- Schedule (Classroom/Lab + ~2 days in field)
- Course Materials (Binder, field sheets, sand card, water bottle, PDFs of presentations)
- Assignments to hand in (worth 30%)
- Exam (written + soils classification) (70%)
- Label your field equipment with your name!
- Reference web page for information/updates:

**https://www.engtech.ca/pei-sa-course-2025/**

# Learning Objectives

- Describe/evaluate site and soil suitability to support on-site sewage systems
- Apply sound soil science and engineering principles

# Learning Objectives, cont'd

- Develop consistent approach to assessing sites
- Apply existing regulations and guidelines for system selection
- Proper documentation and record keeping

# Information Sources

- Construction Standards Handbook for On-Site Sewage Disposal Systems in PEI, May 2013
- PEI Soil Survey Report and maps
- GIS database (PEI Site Assessor App, Geolinc)

# Regulatory Framework

- PEI Water Act - Sewage Disposal Regulations
- Onsite Sewage Disposal Systems in PEI, Construction Standards Handbook (2013).
- PEI Water Act - Water Well Regulations

So lets get started…!

# Purpose of Onsite Assessment on PEI

- Categorize the soil/lot (*Category I, II, III, IV or V ).*
- *Determine thickness of permeable soil*
- *Determine depth to water table and bedrock.*
- *Select/recommend appropriate disposal field types (except for Category III or IV sites where water table is less than 1.22m (4ft).*

# Lot Categorization & Lot Sizes

- Minimum lot sizes, circle diameters Refer to Table F1 – two types of servicing scenarios
- Refer to ETC summary table for Lots with 1 home - Onsite Sewage systems & Individual Onsite Wells
- Minimum setbacks in Table F2

# What are the objectives of Onsite Assessment?

There are two major questions that must be answered;

1) will the soil treat the wastewater before it reaches the ground water table or bedrock?

2) will the soil be able to disperse the effluent into the soil?

# Water Movement

- Ability of soil to transmit water is referred to as the *hydraulic conductivity*, or more generally known as the *permeability*
- Prefer permeable soils where drainage is neither too fast or too slow

# Water Movement

- Too fast – little or no treatment occurs and groundwater is threatened
- Too slow – effluent breakouts, odour

# The Roles of the disposal field

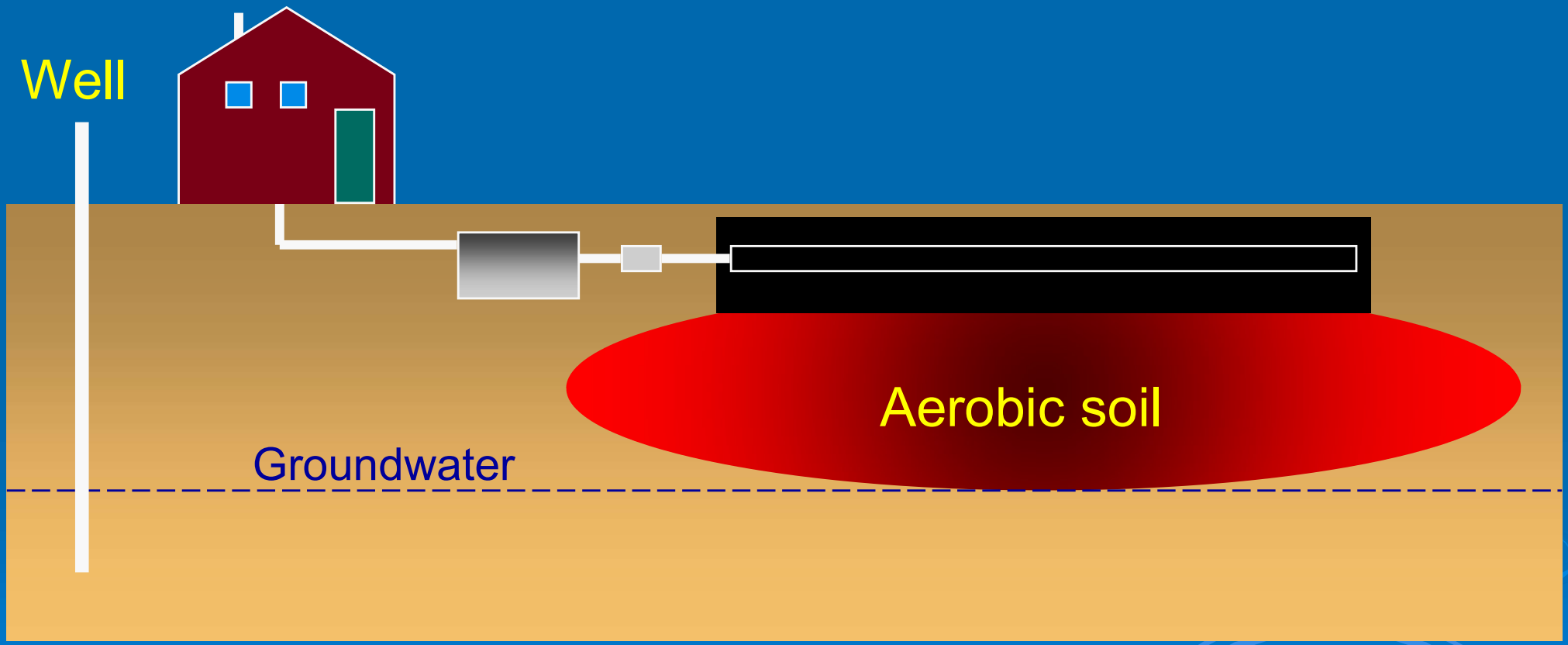
- uniformly distribute the effluent into the soil below the system in order that the hydraulic capacity of the soil is not exceeded

- provide treatment to ensure that effluent leaving the system and entering the groundwater or reaching the ground surface, will not adversely affect public health or the environment.

# Importance of Soil to On-site Wastewater

- Biological treatment
- Chemical treatment
- Physical treatment
- Dispersal

# Aerobic zone



# Soil properties that influence wastewater treatment

- Water movement through the soil
- Restrictive zones or horizons
- Presence of bedrock
- Groundwater depth,
- Surface drainage

# Information Collected At Site

- General site information
- Site specific soils information from test pit
- Soil permeability data
- Depth to bedrock and anticipated maximum water table

# General Site Information

- Appendix H – submission forms
- Field notes: observations and comments
- Site plan – include North arrow!
- Locate test pit(s) (GPS coordinates, setback distances (regulations)

# Disposal Field Siting Limitations Section 4.10 pp.43 (bottom)

- Where water table, at any time <0.60m BGS
- In Non-permeable soil
- In bedrock (including easily excavated, *sandstone bedrock,* often incorrectly referred to as “shale”
- Areas subject to flooding/runoff
- Under roadway, pavement or parking lot
- Under area used by livestock
- Not meeting setbacks in Table F2

# Take Note of

- Wetlands and water courses
- Rock outcrops
- Evidence of infilled areas (poor fill?)
- Vegetation (alders, bullrushes)
- Erosion

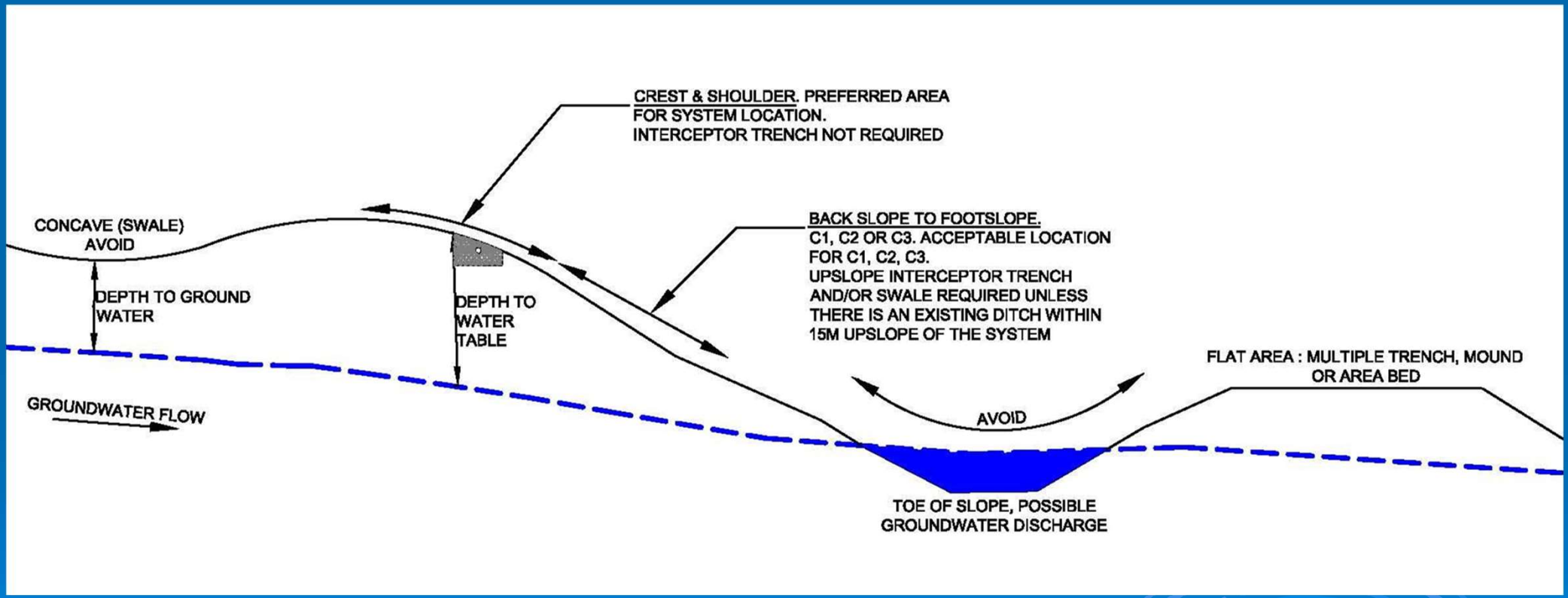
# Take Note of

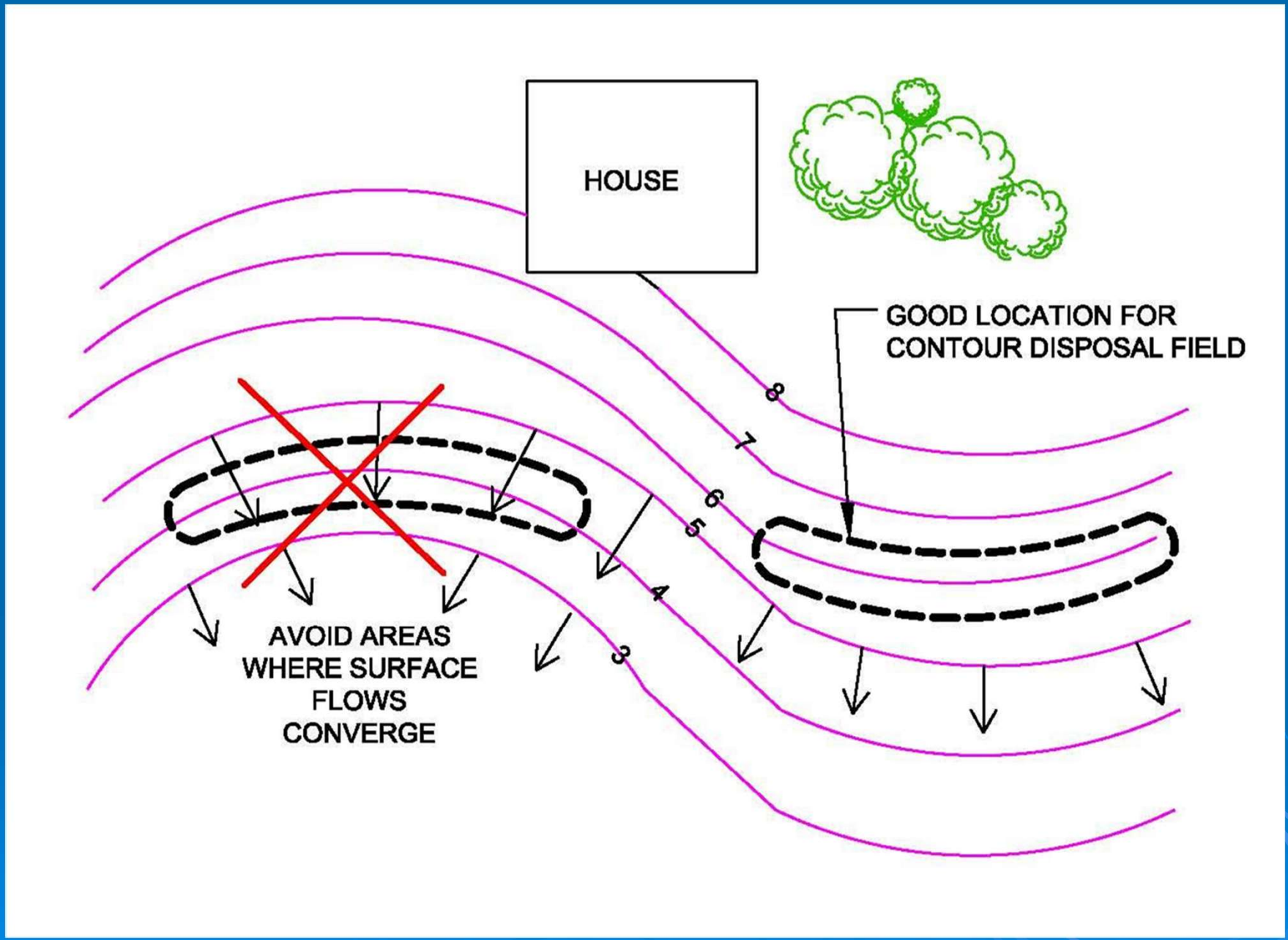
- Low areas (standing water)
- Runoff areas or swales
- Primary or secondary sand dunes
- Location of existing or proposed structures; setbacks

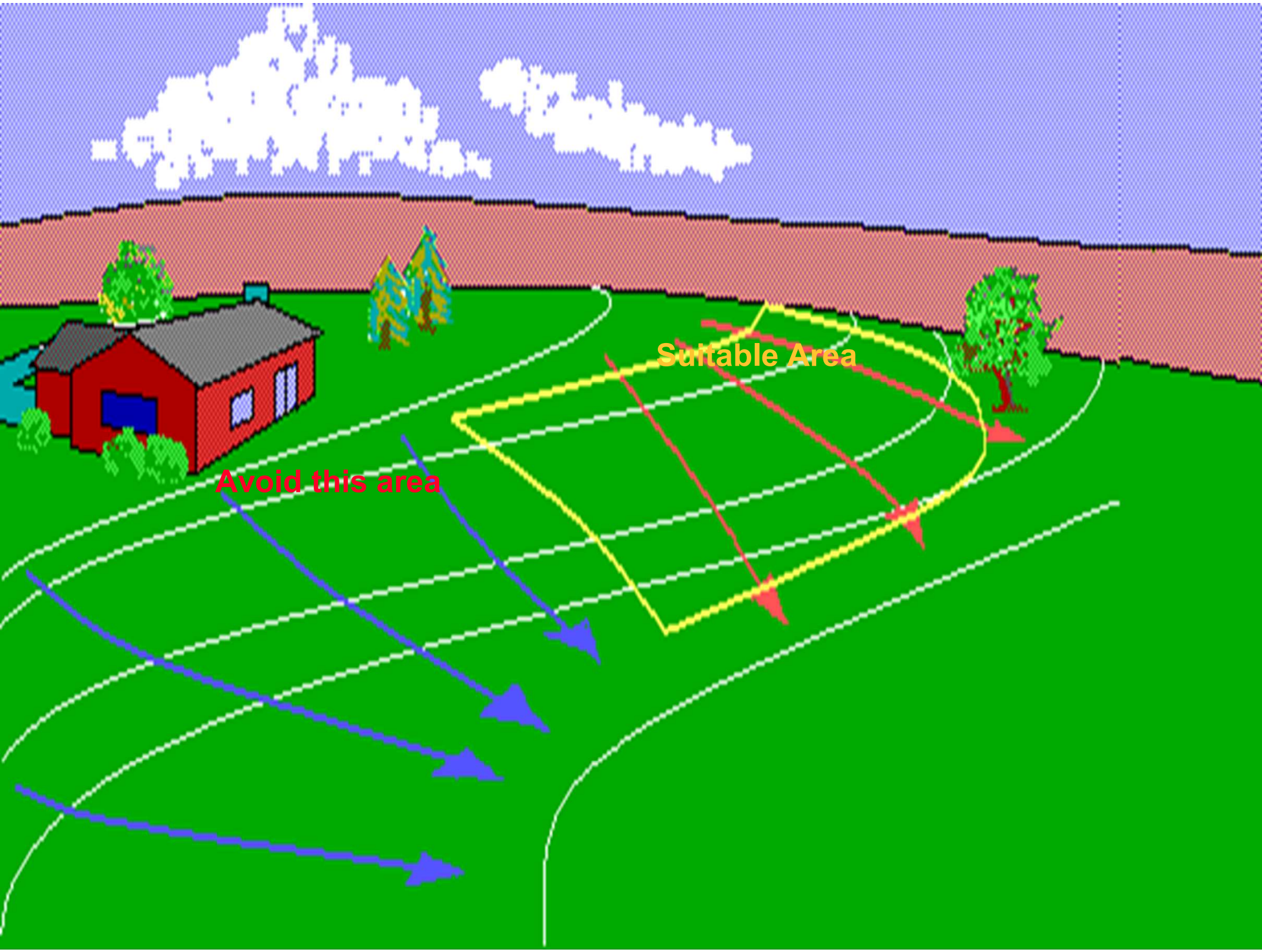
# Other factors to be considered

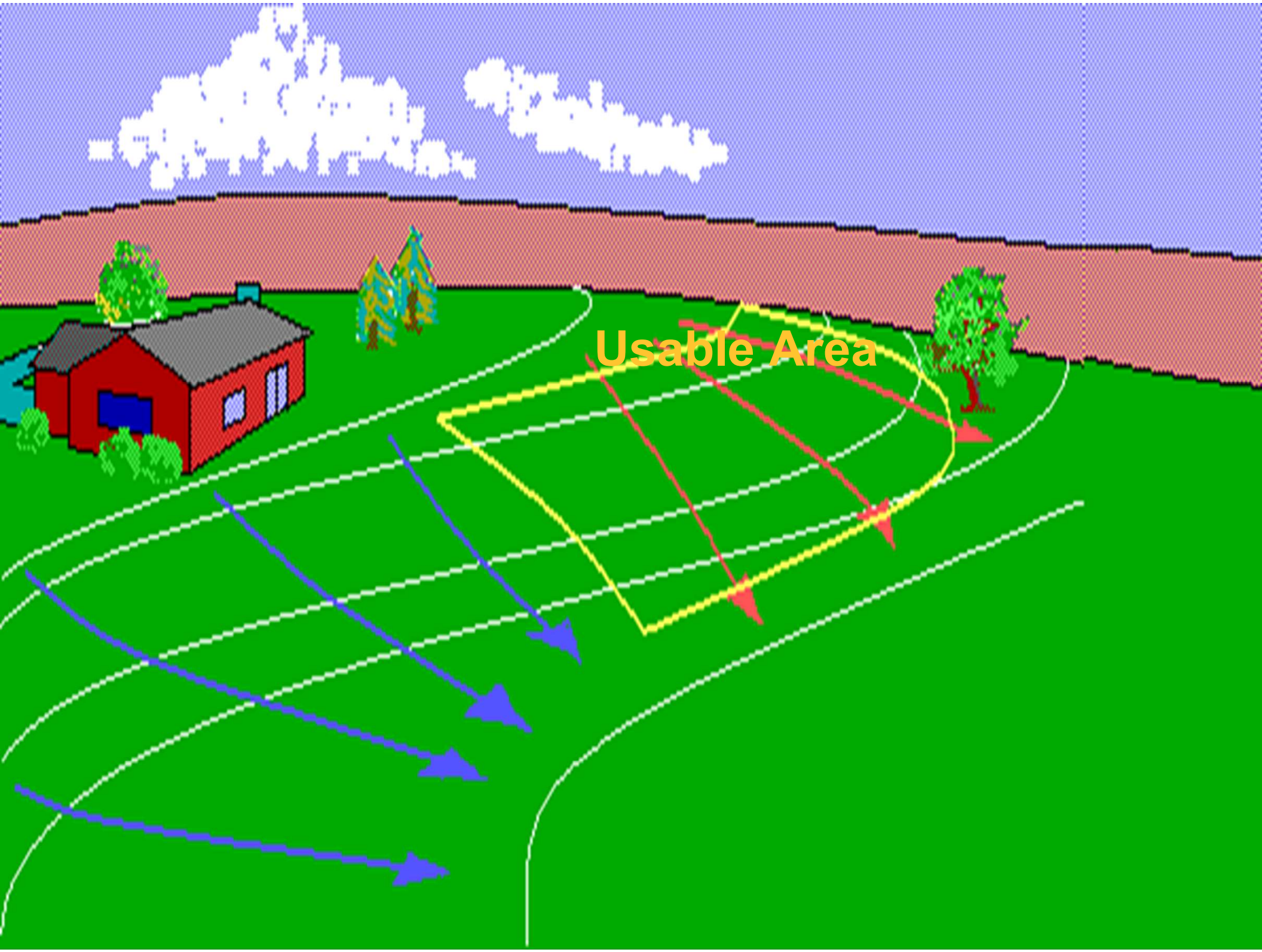
- Land use
- Landscape position
- Proximity to watercourses/wetlands
- Proximity to neighbouring wells

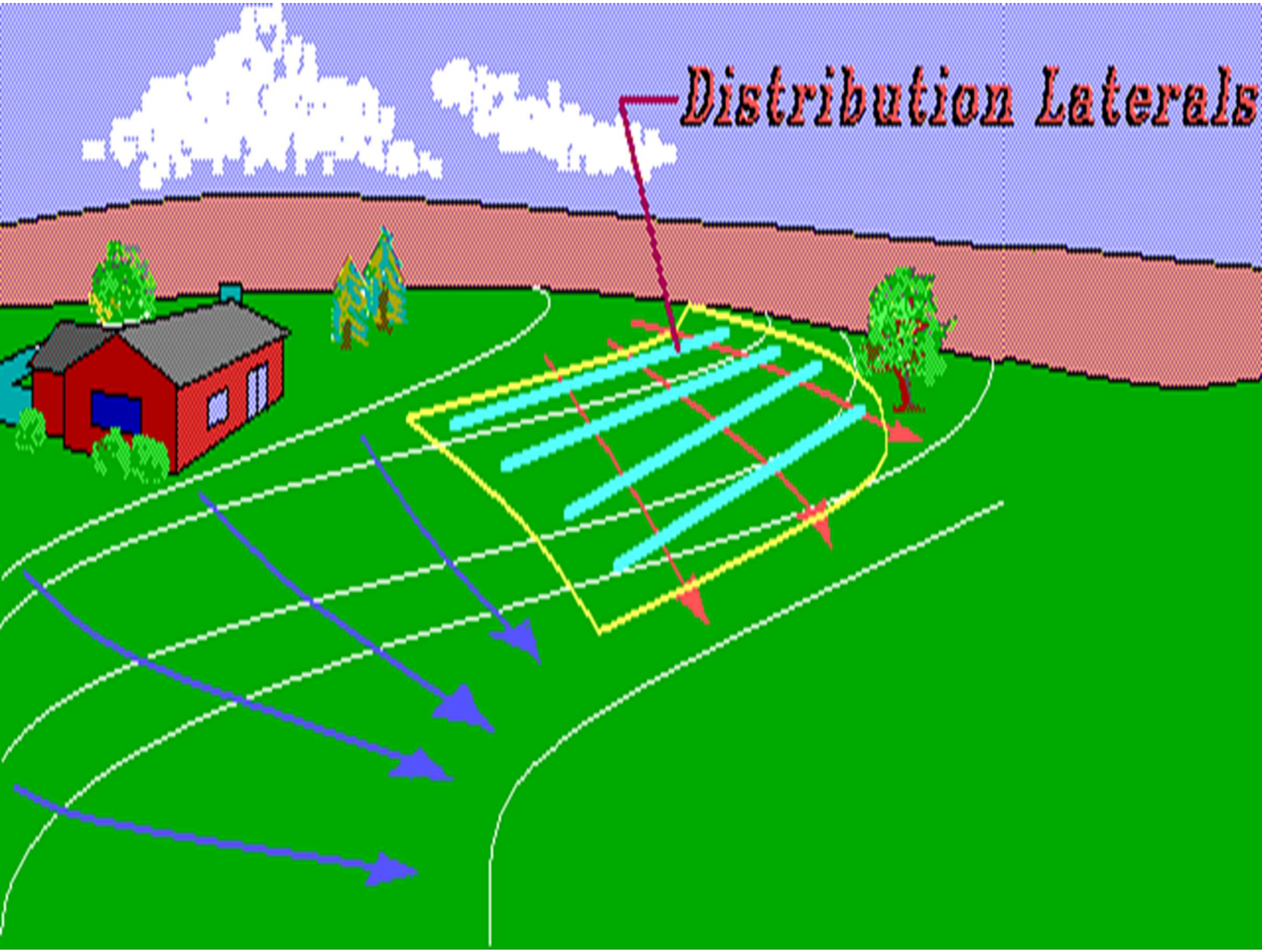
# Pay Attention to Landscape Position




HOUSE
GOOD LOCATION FOR
CONTOUR DISPOSAL FIELD
8
7
6
5
4
3
AVOID AREAS
WHERE SURFACE
FLOWS
CONVERGE


Suitable Area
Avoid this area

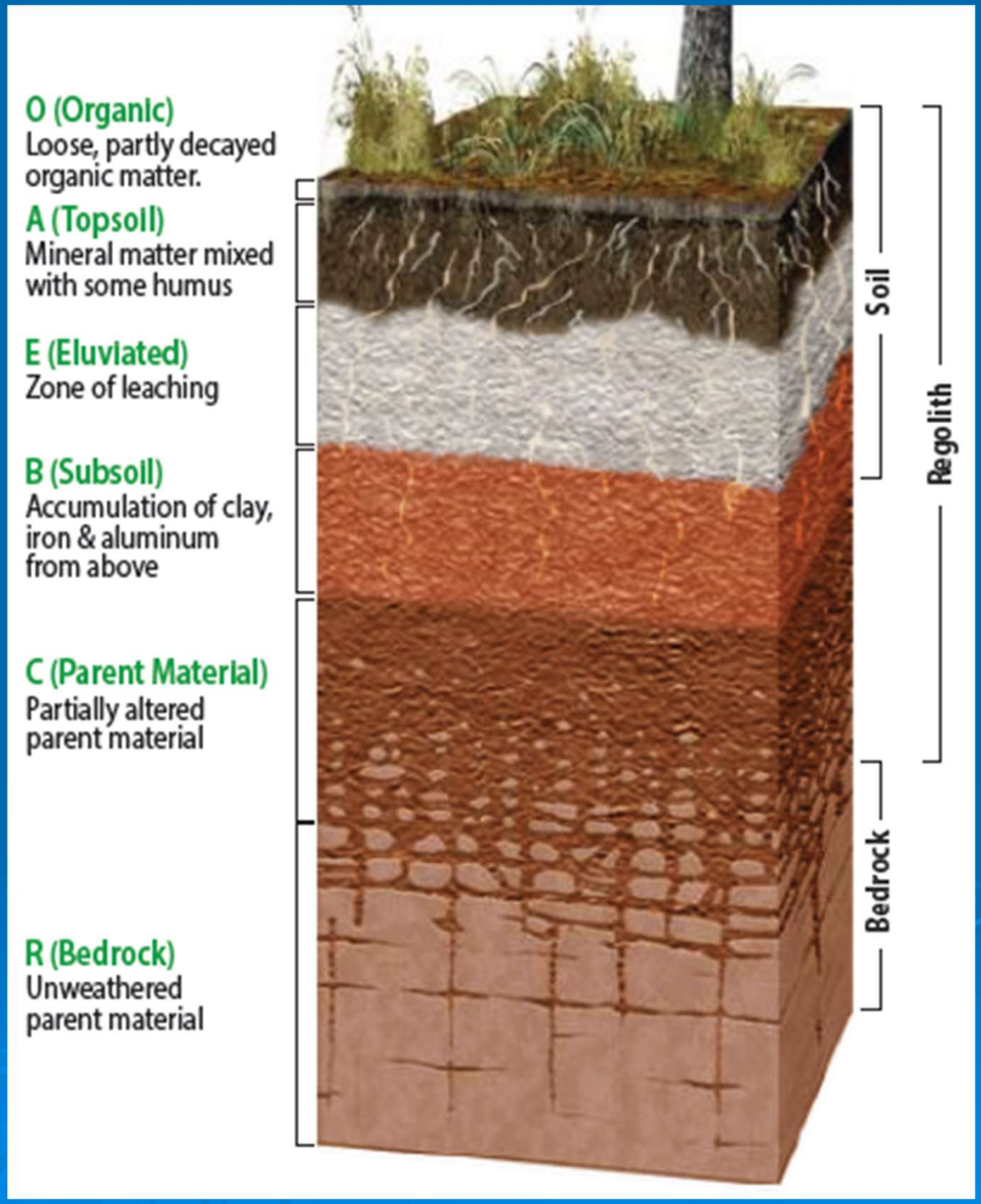

Usable Area


Distribution Laterals

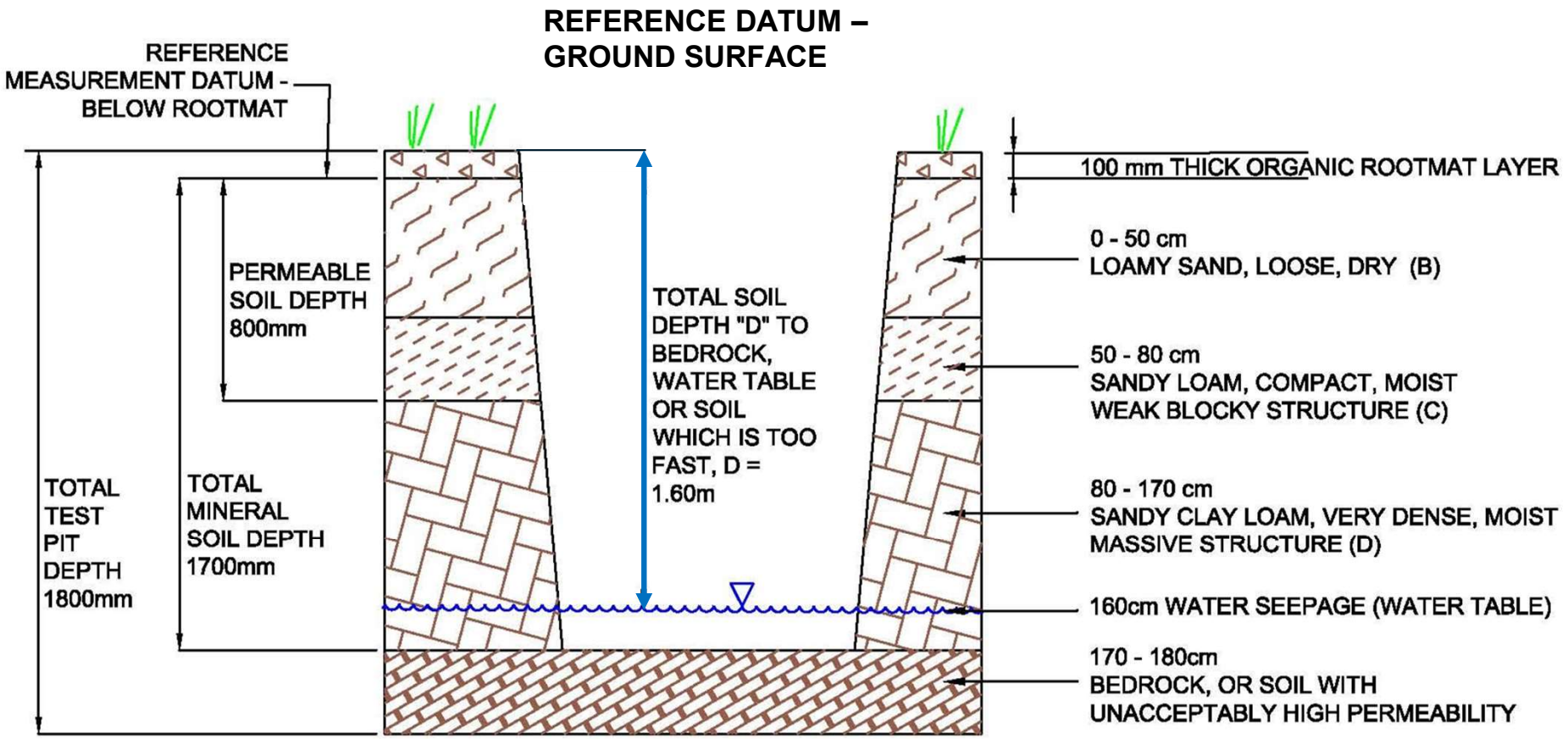
# Soil Profile

- Soil Texture
- Structure
- Density
- Depth of each layer or horizon
- Rooting depth
- Moisture content
- Colour

# Typical Soil Profile



# Example Test Pit



# Soil Profile Logging

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**TEST PIT RECORD**

*www.engtech.ca*

| | | | | | |
|---|---|---|---|---|---|
| **Client:** | | **Logged by:** | | **Test Pit No:** | |
| **Project:** | | **Weather:** | | **Test Pit Size:** | |
| **Location:** | | **Date:** | | **ETC Job No:** | |
| **Root Mat Thickness:** | | | **Rooting Zone Depth:** | | |

| Horizon | Depth (cm) | Texture | Structure | Colour | Density | Moisture |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Estimated Depth of Permeable Soil:** | | | **Estimated Depth to Confining Layer (if any):** | | |
| **Depth to Water Table (cm):** | <60 cm | 60 to 120 | 120 to 180 | >180 cm | **Test Pit Depth:** |
| **Depth to Bedrock (cm):** | <60 cm | 90 to 120 | 120 to 180 | >180 cm | **Lot Category:** |

| | |
|---|---|
| **Comments:** | |
| **Permeability Tests:** | |

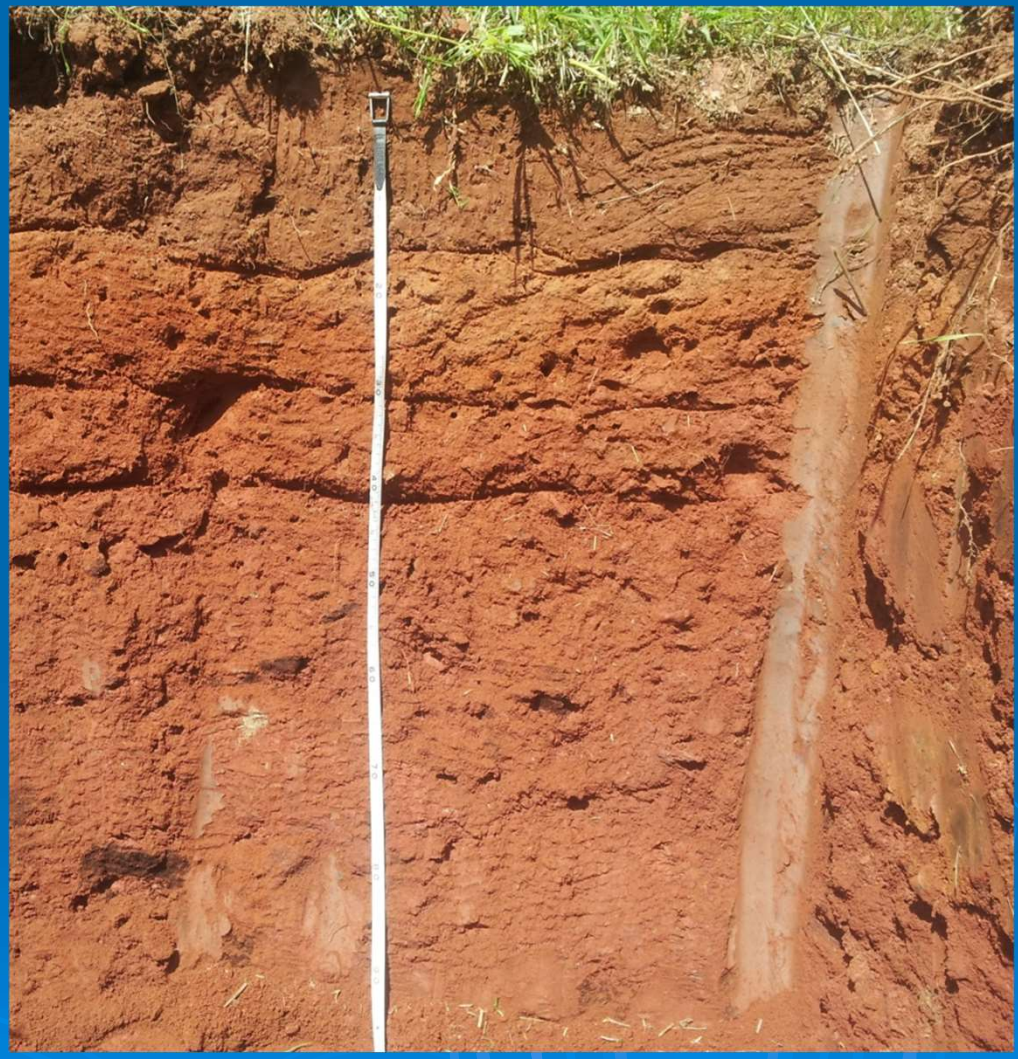
# Test Pit

- Test pit should initially be no more than 1.22m (4 feet) in depth for inspection
- Step-down or slope one end for access
- Visual inspection before you get in (safety first!): are the walls stable, evidence of high water table.)

# Test Pit, cont'd

- Prepare test pit face by scraping away smearing from bucket
- Identify obvious horizons (clues based on changes in colour, density, texture and structure to determine where soil changes occur)

# Remove teeth smear marks



# Test Pit, cont'd

- Need measuring tape, density probe, trowels, water bottle, etc.
- Use flow chart, tables, diagrams to determine depth, texture, structure, colour and density, of each layer.

# Test Pit, cont'd

- Look for indications of high water table (seepage, mottling/redox).
- Make preliminary estimate of depth of permeable soil (**do not include root mat**)
- Make preliminary estimate of depth to water table and bedrock (if any) as **measured from ground surface**.
- Conduct **permeability tests** to confirm depth of permeable soil.

# Test Pit, cont'd

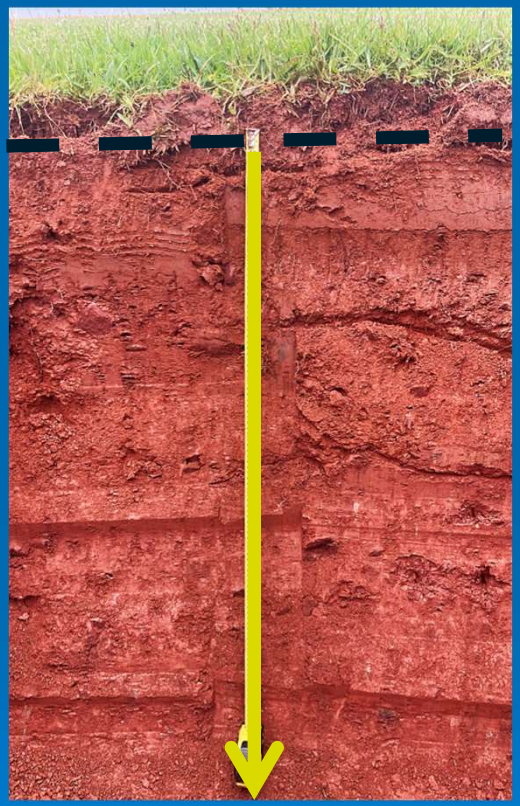
- Exit test pit – do not re-enter!
- Excavate to 1.8m (6 feet) depth
- From ground surface, do final check for bedrock or water table.
- If wet soil/water seepage was observed, leave test pit open for as long as possible.
- Fill in test pit when finished (safety).

# Soil Profile Logging

- Describe soil, bedrock and groundwater seepage to **122cm** below root mat, **unless** you encounter heavy groundwater inflow or bedrock that cannot be excavated (*refusal* on bedrock)

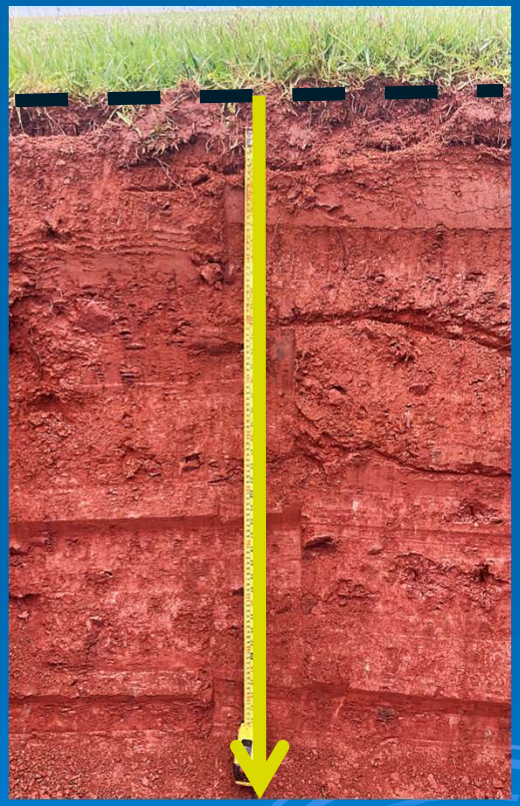
# Soil Profile Logging

## Measuring permeable soil thickness



"Zero point" is underside of rootmat

## Measuring depth to groundwater or bedrock



"Zero point" is ground surface

Indicate the depth that the horizon **starts** and **stops** at.

## TEST PIT RECORD

| | | | | | |
|---|---|---|---|---|---|
| **Client:** | Client name | **Logged by:** | Kelly Galloway | **Test Pit No:** | TP1 |
| **Project:** | Lot categorization | **Weather:** | Sunny, 27C | **Test Pit Size:** | 90cm x 400cm |
| **Location:** | PID# 735266, Clyde River, PE | **Date:** | July 6, 2022 | **ETC Job No:** | 11113 |
| | **Root Mat Thickness:** | 7 cm | | **Rooting Zone Depth:** | 50cm |

| Horizon | Depth (cm) | Texture | Structure | Colour | Density | Moisture |
|---|---|---|---|---|---|---|
| 1 | 0 – 20 | Loam | Weak granular | Brown | Loose | Moist |
| 2 | 20 – 36 | Loamy sand | Structureless single grain | Red brown | Compact | Moist |
| 3 | 36 – 53 | Sandy loam | Weak platy | Red brown | Dense | Moist |
| 4 | 53 – 122 | Sandy loam, 30% gravel, cobbles | Weak blocky | Red brown | Very dense | Moist |
| 5 | 122 – 185 | Sandy loam, then sandstone bedrock (estimated depth 140cm) | Single grain and consolidated rock | Red brown | Very dense | Moist to wet |
| | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Estimated Depth of Permeable Soil:** | | **36cm** | | **Estimated Depth to Limiting Layer (if any):** | | | 53cm |
| **Depth to Water Table:** | 160 cm | <60 cm | 60 to 120 | **120 to 180** | >180 cm | **Test Pit Depth:** | 185 cm |
| **Depth to Bedrock:** | 140 cm | <60 cm | 60 to 120 | **120 to 180** | >180 cm | **Lot Category:** | **2** |

| | |
|---|---|
| **Permeability Tests:** | Permeability test 1 was carried out in the immediate vicinity of the test pit at a depth of 53 cm. Kfs = 3.2 x 10-4 cm/sec (passed). Permeability test 2 was carried out in the immediate vicinity of the test pit at a depth of 35 cm. Kfs = 3.5 x 10-4 cm/sec (passed). |
| **Comments:** | Moderate groundwater inflow at a depth of 160cm. Sandstone bedrock inferred at a depth of 140cm. |

Indicate the actual depth that you believe represents the maximum (highest) seasonal water table.

Also indicate the depth that bedrock was encountered (if at all).

# Permeability Testing

- Conduct *insitu* permeability testing. Recommend two tests per test pit.
- Use test pit data to help guide you on depth of tests.
- Auger permeameter well hole to at least within 10 cm of bottom of layer to be tested if soil is sandy and moderately permeable.

# Categorize Soil & Lot

- Categorize lot based on thickness of permeable soil and depth to bedrock, water table
- Determine slope (see Table 3.1) before selecting system

# Slope of Land