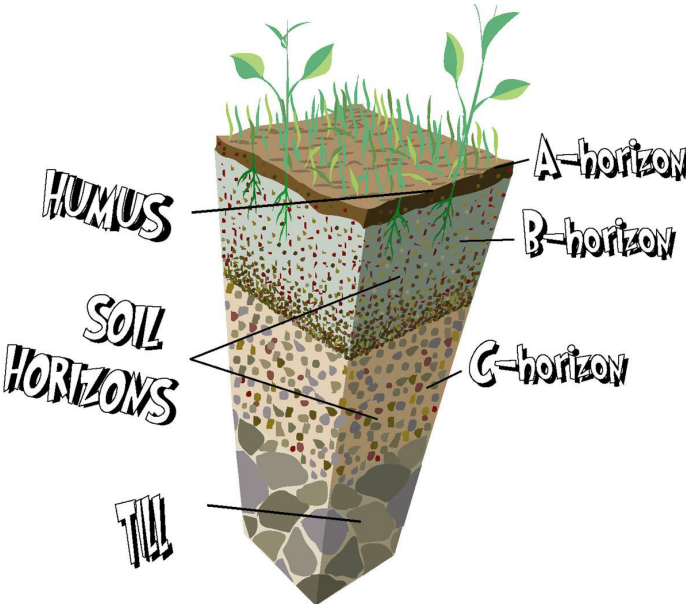
The Plains

Sumptuous Soils

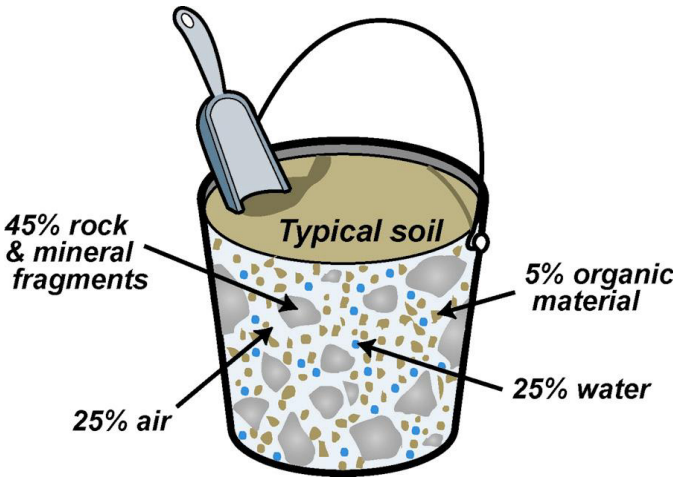
The last glaciation in the Greater Toronto Area (GTA), known as the ***Wisconsinan,*** began approximately 100,000 years ago and ended only about 10,000 years ago. During this period, the ***Laurentide Ice Sheet*** advanced and retreated several times, reaching its maximum coverage about 20,000 years ago when it covered the entire Great Lakes Basin with glaciers up to 2 kilometres thick!

As the **glacier** bulldozed across the land, it eroded the underlying **bedrock**. Soil and rock were transported, ground up and mixed together creating a hard, packed, rocky mixture of **boulders**, **sand**, **silt** and **clay** known as **till**. As the glacier receded, till was deposited across the landscape. Over time, **weathering** by sun, wind, rain and snow broke down the till into finer pieces, creating a relatively flat, evenly drained soil that has a greater moisture holding capacity than sands or clays.

If you dig a hole into the ground, you would see that there are distinct layers called horizons. Together these horizons make up the soil profile. The first horizon, **A horizon**, is the top layer of soil. It is the most fertile due to the accumulation of **organic** matter. This organic matter is called **humus.** Since it is often only 20 to 30 centimetres deep, humus is commonly referred to as **top soil**. Humus adds valuable nutrients to the land and produces excellent soil for agriculture. The **B horizon**, the next layer down, is often referred to as **subsoil**. It is lighter in colour and less fertile than the top layer because it does not contain humus. The thickness of the B horizon can vary from a few centimetres to more than a metre. Finally, the **C horizon**, the soil layer under the subsoil, is made up of the original **parent material** from which the soil developed. The parent material is often till, sand and silt deposits or bedrock.



The Canada Land Inventory (CLI) is a national soil classification index that ranks the potential of specific areas for agricultural production. It considers characteristics of the soil such as depth, drainage, water holding capacity and fertility as well as slope of the land, climate, length of growing season and susceptibility to erosion. It contains classes ranking from Class 1 (the best) to Class 7 (the worst). Class 1 to 3 soils are considered to be prime agricultural land and almost 80% of the GTA (prior to settlement) is covered by these soil classes. This takes on added significance considering that only 5% of the Canadian landmass is classified as prime agricultural land.



In addition to soils, our geological past left behind lakes and landforms which have major effects on controlling the temperature of the region. This is a key ingredient for high-quality agriculture. In the GTA, Lake Ontario generally warms the air. The warmer air is trapped by the higher lands of the Niagara Escarpment and the Oak Ridges Moraine. Warmer temperatures allow for longer growing seasons and help avoid extreme cold snaps.

The CLI has a separate category called organic soils. These are created by decomposed plant matter and are typically found in the deep gouges in carved in bedrock by glacial ice. Here the soil has built up thicknesses of topsoil much greater than those found on the till plains. Today these gouges filled with organic soils are wetlands that perform important **hydrological** and **ecological** functions. When cleared of their natural vegetation, these mucky, black soils form excellent agricultural areas for specialty crops, particularly vegetables. The Holland Marsh is the best known of these areas.

Loss of farmland to urbanization has been increasing as the population of the GTA swells. Between 1976 and 1996, the GTA lost about 60,000 hectares of farmland. To accommodate projected population growth to the year 2021, another 55,000 hectares has been designated for urban use. When combined with historic losses due to urbanization, about 243,000 hectares or 35% of the GTA's total 688,000 hectares of farmland now have urban uses. Because most of this urban growth is located south of the Oak Ridges Moraine where virtually all the land is Class 1, the GTA has lost almost 50% of its Class 1 to 3 lands. The high quality agricultural land of the GTA is a non-renewable resource which provides economic, ecological and social benefits. Understanding the history, geology and characteristics of this resource is important in managing the need for urban growth and the protection of agricultural land.

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After you have finished reading the **Information Bulletin** *Sumptuous Soils* complete the following word jumble and answer the questions in your notebook.

Soil Jumble

Unscramble each of the word clues below. Once this is complete, write the letters that appear in the boxes containing a circle and then unscramble the final message.

ORACNIG	○ □ □ □ □ □ □
HSMUU	□ □ ○ ○ ○
TERPAN ATRILEAM	○ □ □ □ □ □ □ □ □ □ □ □ □ □ ○
NEHTIRWEAG	□ □ □ ○ □ □ □ □ □ □
SOSLIUB	○ ○ □ ○ □ ○ □
POT SOLI	□ ○ □ ○ □ □ □
REULOBD	□ □ ○ □ □ □ □

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □

1. What is the Canada Land Inventory is and why it is important?

2. Use the Canada Land Inventory Map of the GTA and the Map of Urban Expansion, which also contains some information about prominent landforms. What connection can you make between soil class and landforms in the GTA? Provide a reason for your observation?

3. The areas around GTA have Class 1 to 3 soils. What does this mean? Use a Canadian atlas or the Atlas of Canada Web site to find out where agricultural land of the same quality can be found in Canada.

   http://atlas.gc.ca/site/english/maps/archives/5thedition/economic/resourceindustries/mcr4023

4. Do you think the continued expansion of urban areas in the GTA is a threat to Canada's source of food? Why or why not? Use statistics from Canadian atlas or the Atlas of Canada Web site to support your answer.

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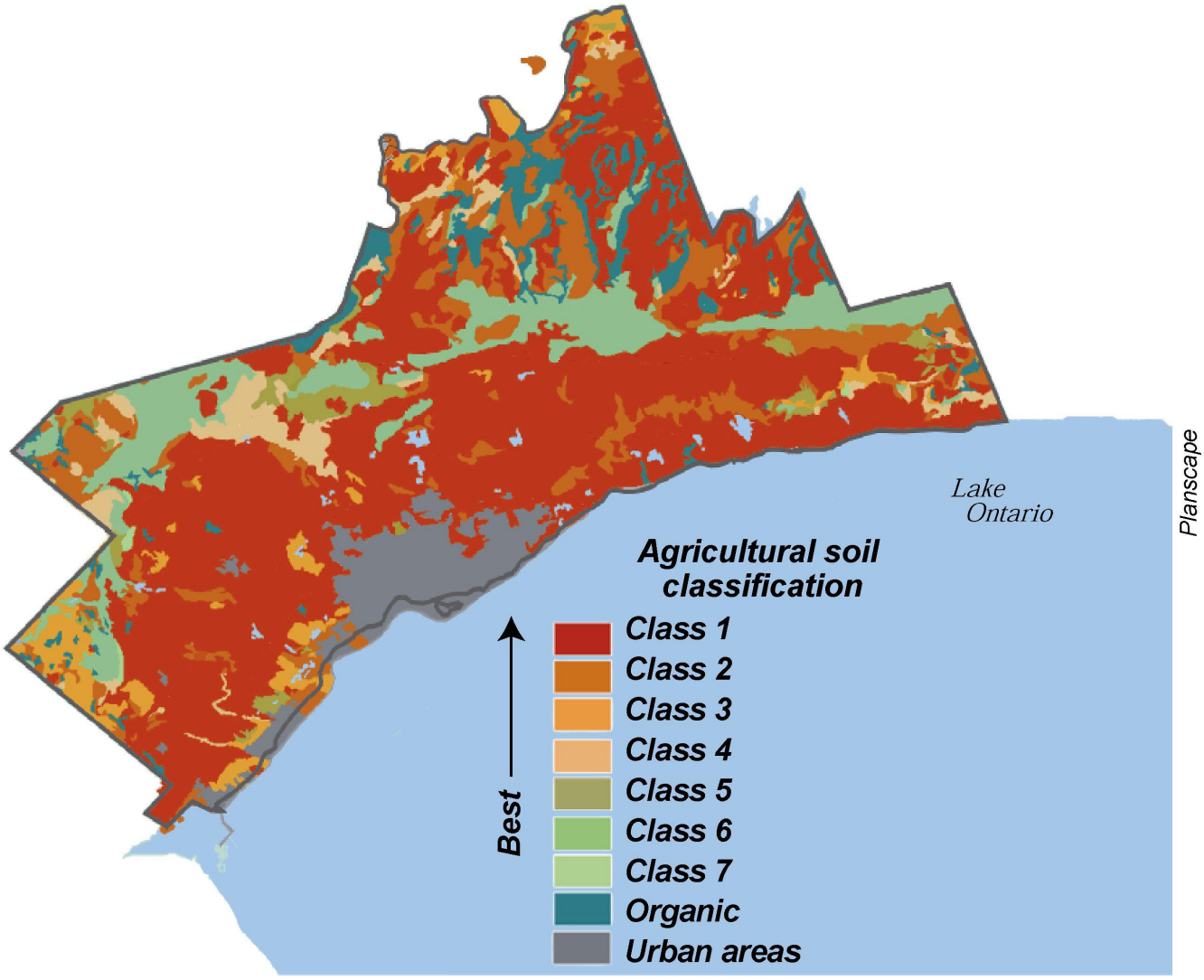
Canada Land Inventory Map of the GTA



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Map of Urban Expansion in the GTA