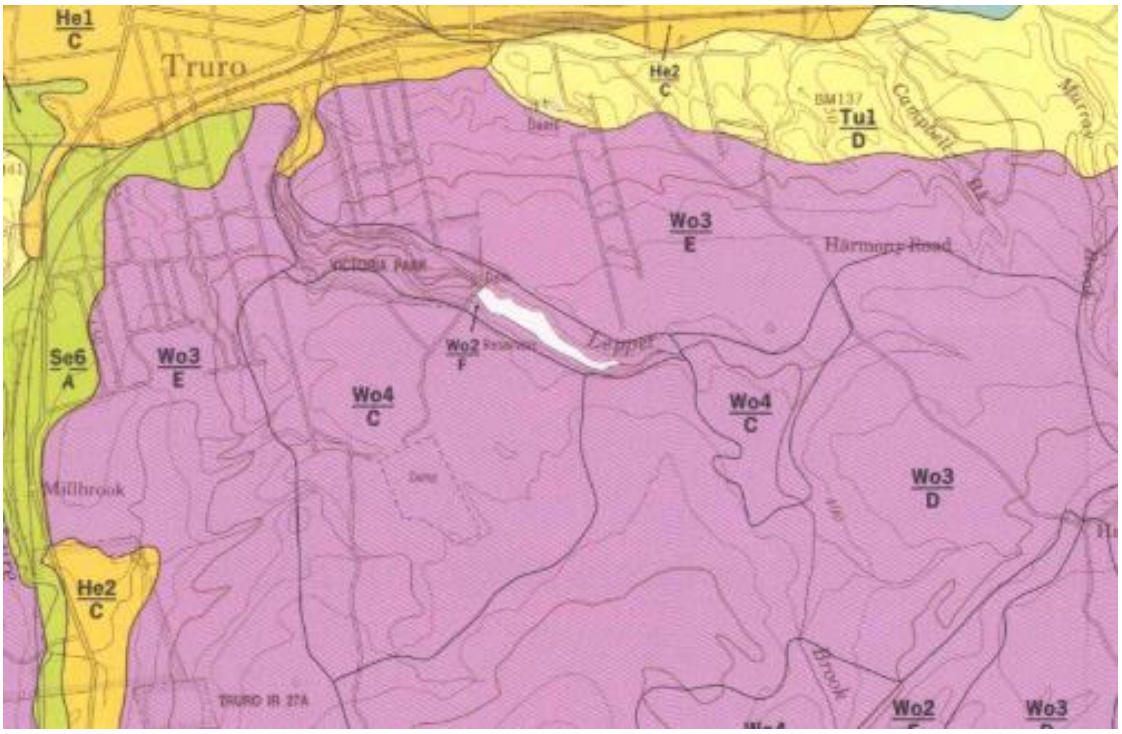
NOVA SCOTIA ENVIROTHON

Sample Soils and Land Use Test Questions

The area you are in is mapped as Woodbourne soil series (Wo). The following description of a Woodbourne soil is adapted from: *Soils of Colchester County, Nova Scotia* (K.T. Webb et al., 1991).



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LEGEND

SOIL ASSOCIATION OR LAND TYPE	SOIL MATERIAL	COLOR & SYMBOL	MAP UNIT DESCRIPTION			
			SOIL COMPONENTS		STONINESS	ROCKINESS
			DOMINANT SOILS	SIGNIFICANT SOILS		
Herbert	40 to 60 cm of gravelly loamy sand to gravelly loam over loose glaciofluvial sands and gravels, usually stratified	**He1**	rapidly to well drained soils		slightly stony	non rocky
		He2	rapidly to well drained soils (He1)	imperfectly drained soils (He3)	slightly stony	non rocky
		He3	imperfectly drained soils		slightly stony	non rocky
		He4	imperfectly drained soils (He3)	poorly drained soils (He5)	slightly stony	non rocky
		He5	poorly drained soils		slightly stony	non rocky
		He6	poorly drained soils (He5)	very poorly drained organic soils (Ct)	slightly stony	non rocky
		He7	rapidly to well drained soils (He1)	poorly drained soils (He5)	slightly stony	non rocky
Stewiacke	Silt loam to silty clay loam, alluvium	**Se3**	imperfectly drained soils		non stony	non rocky
		Se4	imperfectly drained soils (Se3)	poorly drained soils (Se5)	non stony	non rocky
		Se5	poorly drained soils		non stony	non rocky
		Se6	poorly drained soils (Se5)	very poorly drained organic soils (Ct)	non stony	non rocky
Truro	60 to 80 cm of loamy sand to sandy loam over very friable to firm, red, glaciofluvial fine sands and loamy sands	**Tu1**	rapidly to well drained soils		non stony	non rocky
		Tu2	rapidly to well drained soils (Tu1)	imperfectly drained soils (Tu3)	non stony	non rocky
		Tu3	imperfectly drained soils		non stony	non rocky
		Tu4	imperfectly drained soils (Tu3)	poorly drained soils (Tu5)	non stony	non rocky
		Tu5	poorly drained soils		non stony	non rocky
Woodbourne	50 to 70 cm of gravelly loam to gravelly sandy loam over compact, dark reddish brown, gravelly loam to gravelly clay loam till derived from Carboniferous sandstone and shale	**Wo1**	moderately well drained soils		moderately stony	non rocky
		Wo2	moderately well drained soils (Wo1)	imperfectly drained (Wo3)	moderately stony	non rocky
		Wo3	imperfectly drained soils		moderately stony	non rocky
		Wo4	imperfectly drained soils (Wo3)	poorly drained soils (Wo5)	moderately stony	non rocky
		Wo5	poorly drained soils		moderately stony	non rocky
		Wo6	poorly drained soils (Wo5)	very poorly drained organic soils (Ct)	moderately stony	non rocky

Woodbourne Soil Series

Woodbourne soils have developed in 50-70 cm of gravelly loam to gravelly sandy loam over compact, very strongly acidic, dark reddish brown, gravelly loam to gravelly clay loam till. The till is derived from reddish brown and purplish Horton sandstone and shale and contains 20-35% gravels, cobbles, and stones by volume. On level to very gently sloping terrain the massive subsoil causes perched water tables to persist near the surface during wet periods. On steeper terrain, drainage is enhanced on well drained upper slopes while lower slopes receive seepage flow leading to imperfect to poor drainage conditions.

A sample profile of a well-drained Woodbourne soil is described below (taken from NSDNR field plot data). Note that in this profile depth to the clay loam horizon is less than typical.

Horizon	Depth (cm)	Description
LFH	6-0	
Ae	0-12	Light reddish brown (5YR 6/3); sandy loam; friable, 20% gravel and cobbles;
Bf1	12-20	Yellowish red (5YR 4/6); loam to sandy loam; very friable; 20% gravel and cobbles.
Bf2	20-36	Yellowish red (5YR 5/6); loam to sandy loam; very friable; 20% gravel and cobbles.
BC	36-54	Reddish brown (5YR 4/4) clay loam; firm; 10% gravel.
C	54-70+	Reddish brown (5YR 4/3) clay loam; massive; 15% gravel.

Using the information above, assessment of your soil profile, and your knowledge of soils and soil formation processes, answer the following questions:

Are you looking at Woodbourne soil? Comprehensively justify your answer

You are looking at a soil developed under forest conditions with relatively steep slopes. If you examined a soil derived from the same parent material on a level site under pasture management, what two major differences would you expect to see in this profile?

In Nova Scotia we don't have any natural "grassland" or "rangeland" ecosystems, only pastures and meadows created after forest land clearing. This is in contrast to parts of southern Manitoba, Saskatchewan, and Alberta where grassland communities are (or were) the natural vegetation communities. Soils under natural grassland ecosystems are also quite different than in eastern Canada. Podzols are the main soils found in Nova Scotia, but this Soil Order is not found in the Prairies. Why are there no Podzols in the Prairies?

Name two Soil Orders that are only found in grassland ecosystems in western Canada and their main distinguishing features and/or horizons?

Would this soil be suitable for agricultural production? What characteristics would be beneficial? What characteristics would be limiting to crop production? What cropping system would be better to grow on this site, a corn/soybean rotation or forage (grass)? Comprehensively justify your answer.

You are looking at a soil developed under forest conditions with relatively steep slopes. If you could choose another location for agricultural production (refer to the large map clip provided) which soil type would you choose and why?

Unlike the Woodbourne soils, the Stewiacke soils do not encompass large sections of the map and instead appear as thin narrow regions (refer to small map). Why is this?

Referring to the Woodbourne soil profile, how might this soil change if it were cleared, plowed and planted for agricultural production?

Describe the new soil profile under agricultural production:

Soil horizons under forest conditions		Soil horizons under Agricultural conditions	
Horizon	Depth (cm)	Horizon	Depth (cm)
LFH	6-0		
Ae	0-12		
Bf1	12-20		
Bf2	20-36		
BC	36-54		
C	54-70+		

What chemical changes would need to happen to successfully grow crops? How would you know what to add and what products do you think you would have to add?

The area around Brigadoon Village is mapped as well-drained 'Gibraltar' soil. These soils have developed from glacial till deposits derived mainly from granite. Soils and surface conditions are often very stony.

Gibraltar soils normally have a moderately thick forest floor over a well-developed, gray Ae horizon (usually about 10 cm thick). Under this you find well-developed Bhf and/or Bf horizons (reddish brown to yellowish red) that often grade into a BC horizon at around 40-50 cm. The BC horizon is underlain by a C horizon that usually starts at around 60-70 cm. Lower soil horizons are typically yellowish brown in colour. Soils are often high in gravel, cobbles, and/or stones (mainly granite) and texture is usually sandy loam to loamy sand. The open, porous nature of the soil usually allows good internal drainage, but a massive C horizon (basal till layer) can sometime restrict drainage on level ground. B-horizons are also sometimes partially or fully cemented by organic and iron oxide compounds. Gibraltar soils are typically acidic to very acidic.

At what depth does the first B horizon start in your profile?
Fully describe the colour of your first B horizon.
What is the texture class of your first B horizon?
What is the drainage class of this soil/site? (Choose between: Rapid, Well, Moderately Well, Imperfect, Poor, Very Poor) What soil/site factors did you use to make this drainage determination?
Based on your assessment, are you looking at a Gibraltar soil?

List two major limitations of Gibraltar soils for agriculture.

Brigadoon Village is not connected to a municipal sewage system, so it must manage its own sewage on-site. In the chart below you will find a partial list of soil/site features (suitability factors) that must be considered when determining on-site suitability for sewage disposal. Based on your assessment of this test site, circle the best answer beside each suitability factor listed in the table.

Suitability Factor	Good	Fair	Poor	Unsuitable
Depth to compact Subsoil	> 50 cm	< 50 cm	_	_
Flooding	None	Occasional	Frequent	Very Frequent
% Slope	2-9	< 2, 9-15	15-30	> 30
Drainage	W, MW	R, I	P	VP

Based on available information, what is the suitability rating for on-site sewage disposal at this location?

Urban soils generally run the gamut from slightly altered natural soils, to highly disturbed natural soils, to completely anthropogenic soils. The added challenge in urban soil assessment and interpretation (versus natural soils) is you must also consider “urban soil” features.

Urban soils often have higher concentrations of heavy metals versus natural soils (e.g., lead). List the two main sources of increased lead in urban soils.

In natural soils, there is usually a strong relationship between topography and drainage, but this is not always the case for urban soils. Why?

$$S = f\,(cl, p, r, o, t)$$

Soil (S) is a function (*f*) of five main factors (cl, p, r, o, t). These five factors influence (more or less) the main formation processes that "produce" the soil you see. What do the symbols (cl, p, r, o, t) stand for?