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GEOLOGICAL SURVEY
OTTAWA

LEGEND AND NOTES TO ACCOMPANY SURFICIAL GEOLOGY AND GEOMORPHOLOGY MAPS 96 C,D,E, 106 H.

(Maps and Legend to replace Maps 96, C, D, E and 106H by O.L. Hughes, 1969(70), Open File No. 26)

MAP[1] UNIT	NAME	SURFICIAL DEPOSIT: Material	SURFICIAL DEPOSIT: Estimated Thickness	LANDFORM: Topography	LANDFORM: Drainage Pattern	LANDFORM: % Water	GROUND ICE	LAND[2] ZONE	SOILS[3]: Texture U.S.D.A.	SOILS: Unified Classification	SOILS: Micro-relief cm	SOILS: Depth of thaw cm	SOILS: Drainage (deciles)	VEGETATION[4]: Stable	VEGETATION: After Fire	VEGETATION: occurrence**	COMMENTS
fOv	Organic veneer (mapped mainly) as a secondary unit with tMp, tMv)	Peat - typically woody sedge peat	20-60 cm	Shallow channels, runs and depressions; Slope 0-3° Relief to 1 m	Surface seepage in channels, depressions	0-5	Organic veneer lies mainly within the active layer; (for ice in mineral soil below, see associated map unit).	0									Similar to fO; areas with mappable fOv component (+10%) should be avoided in construction of roads, pipelines etc.
								1	woody sedge peat over L-C mineral	Pt / CL-ML	Sedge tussocks 10-50	50-100	Poor to wet 10	Cx-Bi-tL	Cx-Wi	1	
								2	woody sedge peat over L-C mineral	Pt / CL-ML	Sedge tussocks 10-50	50-150	Poor to wet 10	Cx-Bi-tL	Cx-Bi-tL	1	
								3	woody sedge peat over L-C mineral	Pt / CL-ML	Sedge tussocks 10-30	100-200	Poor to wet 10	Cx-Bi-tL	Cx-Bi-tL	1	
								6N	woody sedge peat over L-C mineral	Pt / CL-ML	0	200+	Poor to wet 10	Cx-Al-tL	Cx-Al	1	
fO	Organic (fenland)	Peat - typically woody sedge peat	2-3 m	Flat to very gently to gently sloping, in part with reticulate network of low ridges. Slope 0-2° Relief to 1 m	No organised drainage; water at surface throughout summer months	5-20	Commonly unfrozen to 2+ m (see "Depth of Thaw" for respective zones) little data available on segregated ice content at greater depths.	0									Poor drainage, plus high compressibility and low strength of the material make it unsuitable for any type of construction.
								1	Mesic sedge peat	Pt	0 to tussocky	150 to unfrozen	Wet 10	Cx-Cott. or Cx-Bi-tL	Cx-Cott.	1	
								2	Mesic sedge peat	Pt	None Some sedge tussocks	200 to unfrozen	Wet 10	Cx-Cott. or Cx-Bi-tL	-	1	
								3	Mesic sedge peat	Pt	0	unfrozen	Wet 10	Cx-Cott. or Cx-Bi-tL	-	2	
								6N	Mesic sedge peat	Pt	0	unfrozen	Wet 10	Cx-Bi-tL	-	3	
pO	Organic (peatland)	Peat - typically sedge and woody sedge peat overlain by sphagnum peat	2-4 m	Flat to very gently sloping, typically with numerous shallow steep-sided (2-3 m) depressions occupied by lakes ponds and bogs.	Depressions interconnected by seepage channels	5-20	Commonly up to 20%, locally up to 60% segregated ice within peat; typically 30-100 cm, locally up to 3 m total thickness segregated ice in mineral soil immediately below peat. Peat in wet depressions commonly thawed to 1+ m (Zones 1,2) or unfrozen (Zones 2,3,6N).	0									Subsidence of up to 1 m common, and subsidence up to 3 m possible when vegetation is removed; alternation of permanently frozen peat plateaus and thawed depressions and water bodies presents serious problems in construction of roads, pipelines, etc.; material highly compressible when thawed.
								1	Fibric to mesic peat	Pt	Some polygon trenches to 100cm	20-30	Imp. 10	Lichen-bS	Sphagnum-Er	1	
								2	Fibric to mesic peat	Pt	Some sphagnum hummocks	25-30	Imp. 10	Lichen-bS	Sphagnum-Er	1	
								3	Fibric to mesic peat	Pt	Some sphagnum hummocks	25-30	Imp. 10	Lichen-bS	Sphagnum-Er	3	
								6N	Fibric to mesic peat	Pt	Some sphagnum hummocks	40-50	Imp. 7 Poor 3	bS-moss-Er Sphagnum-bS	Er-bS Sphagnum-Bi	2	
gAp s,gAp $\frac{si}{g}$Ap	Alluvial flood-plain of high energy streams	Sand, gravel in part with silt veneer	1-5+ m sand and/or gravel 0 - 2 m silt	Flood plain and low bordering terraces scarred by braided channels Slope 0-3° Relief to 2 m	Intermittent drainage through braided channels	0	Permafrost lacking in unvegetated parts of flood-plain; elsewhere cement ice only or locally unfrozen (Zones 3,6N), except in silt veneer which commonly has 10-25% segregated ice as thin (1 mm - 2 cm) seams							Occasionally flooded	Frequently* flooded		Subject to periodic flooding; constitutes potential reserve of gravel but extraction presents serious possibility of deleterious changes in stream course and downstream changes in stream regimen.
								1	S+G	SM-GM	0	50-200	Imp. to well	Wi-Al	bare	1	
							... 0 to 3; thin seams of ice observed in weakly consolidated Tertiary siltstone in Zone 6N.	6N									

1. MAP UNIT DESIGNATION

Texture	Genetic Category	Morphology
f-fen	O - organic	v - veneer (< 1.5 m thick)
p-peat	A - alluvial	p - plain
c-clay	C - colluvial	t - terrace
si-silt	E - eolian	d - drumlinoid
s-sand	G - glaciofluvial	s - striated (i.e. fluted)
g-gravel	M - morainal	m - rolling
t-till	S - slumped	h - hummocky
	R - bedrock	r - ridged
sh-shale		k - kettled (glaciofluvial) or thermokarst (glaciolacustrine or alluvial)
ss-sandstone		f - fan
		c - channelled
		x - complex
		b - beach

Superscripts: [1]slope (3-8°) [2]slope (8-12°)

The use of map unit designators is illustrated by the following examples:

tMp[1] - Genetic category designator "M" indicates that the unit is of morainal (glacial) origin
- textural modifier "t" indicates that the surficial material is till, a mixture of clay, silt, sand and gravel sizes
- morphologic modifier "p" indicates the surface is a plain
- superscript "1" indicates that the surface has a slope between 3 and 8°

$\frac{si,s}{g}$At - Genetic category designator "A" indicates that the unit is of alluvial origin
- textural modifier "$\frac{si,s}{g}$" indicates that the surficial material consists of silt with significant sand content, overlying gravel
- morphologic modifier "t" indicates that the area is a terrace (i.e. above the floodplain level of the nearest stream)

Mixed Units

Where the areas of two or more map units are too small to be separately delineated at the map scale, mixed units are used. A common combination is tMp and pfO; the unit comprising over 50% of the total areas is shown first; where the secondary unit comprises 49-25%, the combination is shown as tMp-pfO; where the secondary unit comprises 24-5%, the combination is shown as tMp/pfO; percentages less than 5% are ignored.

MAP SYMBOLS

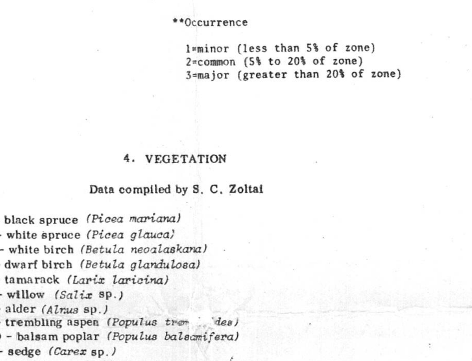
Geological boundary, defined:
approximate:
assumed or transitional:
Escarpments, bedrock:
unconsolidated sediments (with or without underlying bedrock):
Glacial limit:
Shoreline:
Moraine ridge:
Backwall scarp (bedrock) of major slide:
Backwall scarp (retrogressive-thaw flow slide):
Esker:
Drumlin, drumlinoid ridge, ice movement inferred from form:
ice movement not inferred from form:
Prominent hummocks (commonly gravel):
Meltwater channel (major):
Meltwater channel (minor):
Patterned ground:
Sinkhole:

UNEDITED MANUSCRIPT

Compilation by P. T. Hanley, April 1973.

2. INDEX MAP OF LAND ZONES
(Similar vegetation and ground ice content)

Compiled by W. Pettapiece and S. C. Zoltai



**Occurrence

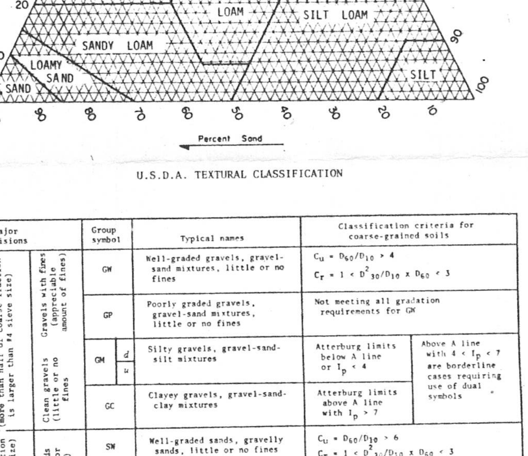
1=minor (less than 5% of zone)
2=common (5% to 20% of zone)
3=major (greater than 20% of zone)

3. SOILS

Data compiled by W. Pettapiece

Microrelief is estimated on the mineral surfaces.

Drainage is estimated from a combination of topographical, vegetal and soil features.



U.S.D.A. TEXTURAL CLASSIFICATION

Major divisions			Group symbol	Typical names	Classification criteria for coarse-grained soils	
Coarse-grained soils (more than half of material is larger than #200)	Gravels (more than half of coarse fraction is larger than #4 sieve size)	Clean gravels (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = D_{60}/D_{10} > 4$; $C_r = 1 < D^2_{30}/D_{10} \times D_{60} < 3$	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW	
		Gravels with fines (appreciable amount of fines)	GM d/u	Silty gravels, gravel-sand-silt mixtures	Atterburg limits below A line or $I_p < 4$	Above A line with $4 < I_p < 7$ are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterburg limits above A line with $I_p > 7$	
	Sands (more than half of coarse fraction is smaller than #4 sieve size)	Clean sands (little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = D_{60}/D_{10} > 6$; $C_r = 1 < D^2_{30}/D_{10} \times D_{60} < 3$	
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW	
		Sands with fines (appreciable amount of fines)	SM d/u	Silty sands, sand-silt mixtures	Atterburg limits below A line or $I_p < 4$	Limits plotting in hatched zone with $4 \le I_p \le 7$ are borderline cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Atterburg limits above A line with $I_p > 7$	
Fine-grained soils (more than half of material is smaller than #200)	Silts and clays (liquid limit < 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	1. Depending on percentages of fines (fraction smaller than 200 sieve size), coarse-grained soils are classified as follows: Less than 5% - GW, GP, SW, SP, More than 12% - GM, GC, SM, SC 5 to 12% - Borderline cases requiring dual symbols	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	Silts and clays (liquid limit > 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity, organic silts		

UNIFIED CLASSIFICATION

4. VEGETATION

Data compiled by S. C. Zoltai

bS - black spruce (*Picea mariana*)
wS - white spruce (*Picea glauca*)
wB - white birch (*Betula neoalaskana*)
Bi - dwarf birch (*Betula glandulosa*)
tL - tamarack (*Larix laricina*)
Wi - willow (*Salix* sp.)
Al - alder (*Alnus* sp.)
tA - trembling aspen (*Populus tremuloides*)
bPO - balsam poplar (*Populus balsamifera*)
Cx - sedge (*Carex* sp.)
tCx - sedge tussock (*Carex* sp.)
Cott.- cotton grass (*Eriophorum* sp.)
Lichen - *Cladonia* sp., *Cetraria* sp.
Sphagnum - *Sphagnum* sp.
Er - Ericaceae (*Ledum* sp., *Chamaedaphne*, *Kalmia* etc.)

* Stable/After fire categories replaced by Occasionally flooded/Frequently flooded for alluvial units, and by South aspect/North aspect for colluvial units.

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